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EDMUND RUFFIN, EDITOR AND PROPRIETOR.

IRRIGATION.

From the Farmer's Encyclopædia.

In agriculture, the watering of the earth, to increase its productiveness. The term, however, is confined to that species of flooding which consists of spreading a sheet of water over a field or meadow, in such a manner that it can be easily withdrawn.

Irrigation, or the artificial watering of the earth, chiefly to produce increased crops of grass, has been in use from a very early period. In Oriental countries, in fact, the heat, of the climate is such, that, in many situations, the now productive soil would be absolutely sterile, were it not that the cultivator enriches his ground with a copious supply of water. The simile employed by Isaiah, (i. 30.), to indicate barenness and desolation, is "a garden that hath no water." And that, in patriarchal times, they labored hard to supply their grounds with water, by means of various hydraulic machines, some of which resembled the water-wheels of the fen districts of England, and were worked by the feet of men, something after the style of the modern tread-mill, is certain. Moses alluded to this practice when he reminded the Israelities of their sowing their corn in Egypt, and watering it with their feet (*Deut.* xi. 10; 2 *Kings* xix. 24,) and in the sandy soils of Arabia the same system is still continued (*Niebuhr*, vol. i. p. 121). According to Dr. Shaw, the following is the modern mode of raising and using the water of the Nile for the purpose of irrigation in Egypt: "Such vegetable productions as require more moisture than what is occasioned by the annual inundation of the Nile, are refreshed by water that is drawn at certain times out of the river, and lodged in large cisterns made for that purpose. The screw of Archimedes seems to have been the instrument formerly made use of for that purpose, through at present the inhabitants either supply themselves with various kinds of leathern buckets or else with a *sakiah*, as they call the Persian wheel, which is the most useful and generally employed machine. Engines and contrivances of both these kinds are placed all along the banks of the Nile, from the sea to the cataracts, their situations being higher, and consequently the difficulty of raising the water being greater, as we advance up the river. When their pulse, saffron, melons, sugar-cane, &c. (all of which are commonly planted in rills,) require to be refreshed, they take out a plug from the bottom of the cistern, and then the water gushing out is conducted from one rill to another by the gardener, who is always ready, as occasions requires, to stop and divert the current." In Egypt at the present day, according to Dr. Clarke, the water is sometimes raised, for the purposes of irrigation, by means of a wicker basket, lined with leather, which is held by cords between two men, who, by this laborious means, swing it over the banks of the Nile into the canal which conveys it to the lands intended to be irrigated. A machine similar to the Persian wheel is still employed in China by the cultivators, for the purposes of irrigation. This use of machinery for the purposes of watering might in fact, in many situations, be advantageously employed in England, to a much greater extent than is commonly believed. It is well known how many thousand acres of valuable land are profitably drained by means of the steam-engine. At this very period a public company is proposing to enclose and drain an arm of the sea in Lincolnshire, by the assistance of its gigantic aid. Yet how rarely, if ever, is that power employed to irrigate the thirsty lands of England; lands of all others the most profitable, the best adapted for the formation of water meadows? The tracts to which I allude are those on a slope, as on a side of a hill; but these are rarely found in situations where a sufficiently copious supply of water can be constantly obtained for the purposes of irrigation. Yet the quantity thus required is not so large as to be beyond the power of the steam-engine to supply; thus, to sufficiently saturate a square yard of a calcareous sand soil with water to the depth of one foot, as in irrigation, requires about 30 gallons of water, equal to about 145,000 gallons per imperial acre. Now, that the steam-engine could readily and profitably supply this quantity of water, may be concluded from several facts; thus, the two engines, one of eighty, the other of sixty horses' power, which keep Deeping Fen, near Spalding, completely drained, when working, in 1835, only ninety-six days, of twelve hours each, raised more than 14,000,000 *tons* of water several feet. The district drained by them contains about 25.000 acres (*Brit. Farm. Mag. N. S.* vol. iii. p. 300), which would otherwise be a complete swamp. And it has been proved that by a common condensing steam-engine, one bushel of coals would raise more than 50,000,000 lbs. of water one foot. In many situations, therefore, where, for the purposes of irrigation, good river water can be copiously obtained, and fuel is at a moderate price, I am confident that great results are yet to be obtained by the aid of mechanical power. For, by the steam-engine, the soils of all others the best adapted for irrigation may be successfully brought into cultivation; for instance, the poor sands and gravels on the sloping banks of many of the English and Scottish rivers, many of whose waters, from being charged with organic matter, the carbonate and sulphate of lime, and various earthy substances, are excellent for the use of water meadows. The early employment of irrigation by the Egyptians and Chinese was most likely the result of the good effects which were observed to be produced by the overflowings of the Nile and the Chinese rivers; for in the "Celestial Empire," irrigation has, it seems, been employed, according to their veracious historians, for a period long before that assigned to the flood. In Italy, especially on the banks of the Po, the cultivators of the earth have certainly employed this process for a period previous to the days of Virgil. (*Georg.* lib. i. v. 106-9)—

Deinde satis fluvium inducit, rivosque sequentes—

and it is still carried on with a zeal and care worthy of the art they practice. M. P. Cato, the earliest of the Roman writers upon agriculture, (150 years before Christ,) in his ninth chapter, told the Italian farmers to "make water meadows if you have water, and if you have no water, have dry meadows." The directions of Columella seem to have all the freshness of a modern age about them. He was the first who noticed the inferior nutrition afforded by the hay from water meadows. "Land," says he, "that is naturally rich, and is in good heart, does not need to have water set over it; and it is better hay which nature, of its own accord, produces in a juicy soil, than what water draws from a soil that is overflowed. This, however, is a necessary practice when the property of the soil requires it; and a meadow may be formed either upon a stiff or free soil, though poor when water may be set over it; neither a low field with hollows, nor a field broken with steep rising ground, is proper; the first, because it contains too long the water collected in the hollows; the last, because it makes the water run too quickly over it. A field, however, that has a moderate descent may be made a meadow, whether it be rich, or so situated as to be watered; but the best situation is where the surface is smooth, and the descent so gentle, as to prevent either showers, or the rivers that overflow it, remaining too long; and, on the other hand, to allow the water that comes over it quietly to glide off; therefore, if in any part of the field intended for a meadow, a pool of water should stand, it must be let off by drains, for the loss is equal either from too much water or too little grass." (*Col.* lib. ii. c. 16). Pliny tells us that "meadows ought to be watered immediately after the spring equinox, and the waters restrained whenever the grass shoots up into stalks" (*Nat. Hist.* lib. xviii. c. 27). When, after the fall of the Roman empire, agriculture, in common with all other sciences, rapidly declined, a very remarkable exception to this melancholy result of slavery and despotism was presented in the case of irrigation, which was carried on and extended through the long period of the dark ages with equal zeal and success. This was more especially the case in Lombardy, where it was certainly prosecuted on a very bold and profitable scale long before 1037. The princes of Lombardy patronized and followed the example of the various religious establishments, which then monopolized all the wealth and learning of the land, in extending the employment of water in all possible directions. The monks of Chiazevalle, in particular, were so celebrated for their knowledge of this branch of agriculture, and of hydraulics in general, that the emperor, Frederick the First, in the thirteenth century, very gladly sought their advice and assistance. This system has ever been zealously and carefully extended and improved, in every possible way. The waters of the chief rivers of the north of Italy, such as the Po, the Adige, the Tagliamento, and of all the minor streams, are employed in irrigation. There is no other country which possesses an extent of rich water meadows equal to that of the Lombards. The entire country from Venice to Turin may be said to be formed into one great water meadow; yet the irrigating system is not confined to grass lands; the water is conveyed into the hollows between the ridges in corn lands, into the low lands where rice is cultivated, and around the roots of vines. From Italy the practice extended into the south of France, into Spain, and then into Britain. In the states of Lombardy, the water of all the rivers belongs to the state; in those of Venice, the government extends its claims to that of the smaller springs, and even to collections of rain water, so highly, for the use of the cultivator, is water of every kind valued in the north of Italy. It is necessary, therefore, in Lombardy, to purchase from the state the water taken from the river; this may be taken, by means of a canal, through any person's grounds, the government merely requiring the payment of the value of the land to the proprietor, and restraining him from carrying his canal through a garden, or within a certain distance of a mansion. The water is sold by the government at a certain rate, which is regulated by the size of the sluice, and the time the run of water is used; this is either by the hour, half-hour, or quarter, or by so many days at certain periods of the year; the right to these runs of water is regularly sold like other property. Arthur Young gives an account of the sale of an hour's run of water through a sluice near Turin, which produced, in 1778, 1500 livres. The rent of the irrigated lands in the north of Italy is, upon an average, more than one-third greater than the same description of land not watered. (*Com. Board of Agr.* vol. vii. p. 189).

In Bengal, wells are dug in the highest part of their fields, and from this, by means of bullocks and a rope over a pulley, water is raised in buckets and conveyed in little channels to every part of the field. No attempts at cultivation are here made without the assistance of water, obtained by some mode or other.

The art of irrigation was not confined to the old world. The Mexicans practised it long before the days of Columbus; they collected the mountain torrents, and conducted their waters to their lands in proper channels, with much care and address. It was only towards the termination of the seventeenth century that water-meadows were constructed in Britain upon any thing like a regular system. Of these, those in Wiltshire, which are amongst the most celebrated in England, especially those in the Wyley Bourn, were made between 1700 and 1705. Those of Hampshire and Berkshire were constructed about the same period, but they were at first formed very inferior to the modern water-meadow lands of those counties. Great improvements were made towards the conclusion of the eighteenth century, through the publications of G. Boswell on meadow watering in 1780, and of the Rev. T. Wright, of Auld, in Northamptonshire, whose writings appeared at intervals from 1789 to 1810. It is noticeable that the water employed for these celebrated southern meads is perhaps the most clear and swift flowing of all the English rivers: issuing from the chalk formation, it is equally copious and transparent. Some of the chief advantages, therefore, of irrigation may evidently be derived from almost any description of water; for it is proved by the good effects produced by the brilliant chalk-waters of the south of England, and the still greater fertilizing effects of those surcharged with organic matter, as in the Craigintinny meadows near Edinburgh, that there is no water too bright or

too full of impurities, to be useless for the purposes of irrigation.

I propose in this paper to investigate the chemical properties of river water, and of the effects produced by it in irrigation, adding a few remarks upon the practice of the best and most skilful cultivators of the water-meadows of the south of England.

1. With regard to the composition of river water, there have been several chemical examinations; that of the Thames was analyzed by Dr. Bostock, who found, in 10,000 parts after most of its mechanically suspended matters had subsided, about $1\frac{3}{4}$ parts of foreign substances, viz.—

	Parts.
Organic matters - - -	0.07
Carbonate of lime - - -	1.53
Sulphate of lime - - -	0.15
Muriate of soda - - -	0.02

In an equal quantity of the waters of the Clyde, Dr. Thomson found $1\frac{1}{6}$ part of solid substances, namely,—

	Parts.
Common salt - - -	0.369
Muriate of magnesia - -	0.305
Sulphate of soda - - -	0.114
Carbonate of lime - - -	0.394
Silica - - - - -	0.118

The water of the Itchen in Hampshire is one of the most celebrated of all the southern streams, for the use of the irrigator. I found in 10,000 parts of its water, about $2\frac{1}{2}$ parts of solid matter, viz:—

	Parts.
Organic matter - - -	0.02
Carbonate of lime - - -	1.89
Sulphate of lime - - -	0.72
Muriate of soda - - -	0.01

From an examination of the substances found in these streams and they afford a pretty correct view of the contents of most others, the farmer will see that they all yield ingredients which are the food or natural constituents of the grasses. Thus, sulphate and carbonate of lime are found in most of them, and there is no river water which does not contain, in some proportion or other, organic matter. To ascertain, therefore, whether pure water was alone able to effect all the magic effects of irrigation, it was necessary to employ other water than that of rivers, lakes, or even springs. Pure water, as obtained by distillation, therefore, has been tried as a supporter of vegetation, but it was found totally inadequate to the support of plants,—they merely vegetated for a time, but they could not, by any means, be made to perfect their seeds. In this conclusion, the experiments of Dr. Thomson, and of MM. Saussure and Hassenfratz, entirely agree. Pure water, therefore, notwithstanding the dreams of the Greek philosophers, and the celebrated deceptive experiments of Van Helmont with his willow tree, is not able to support the growth of the grasses. Van Helmont's tree, when he planted it in an earthern pot, weighed five pounds; the earth previously dried in an oven, weighed 200 pounds; after five years it weighed 164 lbs., although it had been watered during that time with only rain and distilled water, and the earth had lost only two ounces in weight. Hence, said Van Helmont and his disciples, water is the sole food of plants. Bergman, in 1773, first pointed out the source of error. He showed, from the experiments of Margraff, that the rain-water contained a sufficient quantity of earth to account for the increased weight in the willow, every pint of rain-water containing one grain of earth. Then, again, the earthen vessel (which was sunk in the earth) would in this experiment transmit its moisture impregnated with all kinds of soluble substances. And yet, it has been shown, that impure water, such as that from a sewer or from a dunghill, is alone sufficient to sustain vegetation. This was clearly evidenced in the experiments of M. Lampadius; for he found, that plants placed in a pure earth, such as silica or alumina, although they would not grow when watered with pure water only, yet, when watered with the liquid drainage of a dunghill, they flourished very luxuriantly, and this fact has been also proved in another way. It has been shown by chemical analysis, that the quantity of solid or earthy matters absorbed by plants, is in exact proportion to the impurity of the water with which they are nourished. Thus, equal quantities of some plants of beans, fed by distilled water, yielded

	Parts.
Of solid matters or ashes - - -	3.9
Those fed by rain-water - - -	7.5
Those grown in garden mould - -	12.0

These facts strongly confirm the conclusions of some of the most sagacious cultivators, that the chief advantages of irrigations are attributable to the foreign substances with which the water is charged, although, as I have elsewhere observed, almost every farmer has a mode of accounting for the highly fertilizing effects of irrigation—one thinks it cools the land, another that it keeps the grass warm in winter. And this was Davy's opinion. He thought that a winter flooding protected the grass from the injurious effects of frost. He says, "Water is of greater specific gravity at 42 deg. that at 32 deg.—the freezing point; and hence, in a meadow irrigated in winter, the water immediately in contact with the grass is rarely below 40 deg., a degree of temperature not at all prejudicial to the living organs of plants. In 1804, in the month of March, I examined the temperature in a water meadow near Hungerford in Berkshire, by a very delicate thermometer. The temperature of the air at seven in the morning, was 43 deg. In general, those waters which breed the best fish are the best fitted for watering meadows, but most of the benefits of irrigation may be derived from any kind of water."

Such were the opinions of Davy as to the fertilizing properties of water. It is to be regretted that the opportunities for agricultural observations of this great chemical philosopher were so few, for his valuable remarks were always cautiously made. He appears, however, as I have remarked elsewhere, never to have steadily investigated the chemical composition of river-water with regard to its uses in irrigation, and, in consequence, knew little of the value of some of its impurities to vegetation. Thus, if the river water contains gypsum (sulphate of lime,) which it certainly does—if the water is hard, it must, under ordinary circumstances, on this account alone be highly fertilizing to meadows, since all grasses contain this salt in very sensible proportions; for, calculating that one part of sulphate of lime is contained in

every two thousand parts of river water, and that every square yard of dry meadow soil absorbs only eight gallons of water (and this is a very moderate allowance, for many soils will absorb three or four times that quantity,) then it will be found that, by every flooding, more than one hundred weight and a half of gypsum per acre is diffused through the soil in the water, a quantity equal to that generally adopted by those who spread gypsum on their clover crops, lucerne, and sainfoin, as a manure, either in the state of powder, or as it exists in ashes. And if we apply the same calculation to the organic substances ever more or less contained in flood waters, and allow only 20 parts of animal and vegetable remains to be present in a thousand parts of river water, then we shall find, taking the same data, that every soaking with such water will add to the meadow nearly two tons per acre of animal and vegetable matters, which, allowing in the case of water meadows, five floodings per annum, is equal to a yearly application of ten tons of organic matter.

The quantity of foreign substances present in river water, although commonly less, yet very often exceeds what I have thus calculated to exist in it. I have found it impossible, however, to give, from analysis, the amount which, under ordinary circumstances, is present in river waters, with any tolerable accuracy, since the proportion not only varies at different seasons of the year, but a considerable proportion of the merely mechanically suspended matters subside, when the specimen water is suffered to rest. In my conclusions with regard to the theory of irrigation, I have found many excellent practical farmers concur. Thus, Mr. Simmons of St. Croix, near Winchester, considers that the great benefit of winter flooding for meadows is derived, in the first place, from the deposits made by the muddy waters on the grass; and, secondly, from the winter covering with water preventing the ill effects to the grass of sudden transitions in the temperature of the atmosphere. This gentleman is perfectly aware of the value of the addition of the city drainage of Winchester to the fertilizing qualities of the Itchen river water, and of its superiority for irrigation after it has flowed past the city, having water meadows both above and below the town; and he finds that if the water has been once used for irrigation, that then its fertilizing properties are so materially reduced, that it is of little value for again passing over the meadows; and so convinced is he of this fact by long experience, that, having in this way long enjoyed the exclusive and valuable use of a branch of the waters of the Itchen for some grass land, a neighbor higher up the stream followed his example, constructing some water-meadows, and using the water before it arrived at those of my informant, who, in consequence, found the water so deteriorated in quality (though not sensibly diminished in quantity), that he had once thought of disputing the right with his more upland neighbor. The experience of other irrigators tends to the same conclusion. In the best managed water meadows of Hampshire the farmer does not procure annually more than three crops of grass; yet in situations where a richer water is employed, as near Edinburgh, four or five are readily obtained. It is evident, therefore, that the chemical properties of water have a much greater influence in irrigation than is commonly believed. The quality of the water, therefore, employed for the purposes of irrigation, is of the first importance to be well understood by the farmer; and although many more modern discussions have taken place upon the subject, yet the definition which the great Lord Bacon gave in his Natural History, of the advantages of "Meadow Watering," has never been excelled—"that it acts not only by supplying useful moisture to the grass, but likewise by carrying nourishment dissolved in the water." This nourishment is, generally speaking, composed almost entirely of the animal and vegetable matters mechanically suspended or chemically dissolved in the water; the fouler the water the more fertilizing are its effects. The objection which has been sometimes urged to this explanation, by instancing the prejudicial effects of some very thick muddy waters (as those of the Humber) on meadow lands, is very erroneous; for, in those cases, the mud deposited on the grass did not consist of animal or vegetable matters, but of fine earthy particles, such as clay or chalk, substances of which the alluvial soil, on which the same flood waters had for ages occasionally deposited their earths, was in fact entirely composed, and to which, in consequence, any farther supply was almost useless, the earthy slime merely covering the grass with mud, without adding a single fertilizing ingredient not already abounding in the soil. If, however, the soil is naturally deficient in any of the earthy ingredients contained in the water, then even such flood waters are ever found most fertilizing.

"The agency of water in the process of vegetation," says Mr. Stephens, "has not till of late been distinctly perceived. Dr. Hales has shown that, in the summer months, a sunflower, weighing three pounds avoirdupois, and regularly watered every day, passed through it or perspired twenty-two ounces each day, that is, half its weight. Dr. Woodward found that, in the space of seventy-seven days, a plant of common spearmint increased seventeen grains in weight, and yet had no other food than pure rain water; but then he found that it increased more in weight when it lived in spring water, and still more when its food was Thames water." (Practical Irrigator, p. 2.) And when speaking of the fact, that some irrigators think clear spring water equal to any, he adds (p. 24), "I would recommend to those who are of the same opinion, to inspect the irrigated meadows which are watered by the washings of the city of Edinburgh, where, I trust, they will find the superiority of muddy water to that of clear spring water most strikingly manifested."

Edinburgh has many advantages over the most of her sister cities; the large supply of excellent spring water is one of the greatest blessings to her numerous inhabitants, both in respect to household purposes and keeping the streets clean, as well as irrigating the extensive meadows situated below the town, by the rich stuff which it carries along in a state of semi-solution, where the art of man, with the common sewer water, has made sand hillocks produce riches far superior to anything of the kind in the kingdom, or in any other country.

By this water, about two hundred acres of grass land, for the most part laid into catch-work meadows, are irrigated; whereof one hundred and thirty belong to W. H. Miller, Esq., of Craigin-

tinny, and the remainder, to the Earls of Haddington and Moray, and other proprietors. The meadows belonging to these noblemen, and part of the Craigintinny meadows, or what is called the old meadows, containing about fifty acres, have been irrigated for nearly a century. They are by far the most valuable, on account of the long and continual accumulation of the rich sediment left by the water; indeed the water is so very rich, that the tenants of the meadows lying nearest the town have found it advisable to carry the common sewer water through deep ponds, into which the water deposits part of the superfluous manure before it runs over the ground. Although the formation of these meadows is irregular, and the management very imperfect, the effects of the water are astonishing; they produce crops of grass not to be equalled, being cut from four to six times a year, and the grass given green to milch cows.

The grass is let every year by public sale, in small patches of a quarter of an acre and upwards, and generally brings from 24*l.* to 30*l.* per acre per annum. In 1826, part of the Earl of Moray's meadow fetched 57*l.* per acre per annum.

About forty acres of the Craigintinny lands were formed into catch-work water meadow before the year 1800, which comprises what is called Fillieside Bank old meadows, and is generally let at from 20*l.* to 30*l.* per acre per annum. In the spring of 1821, thirty acres of waste land, called the Freegate Whins, and ten acres of poor sandy soil, were levelled and formed into irrigated meadow, at an expense of 1000*l.* The pasture of the Freegate Whins was let, previously to this improvement, for 40*l.* per annum, and the ten acres for 60*l.* They now bring from 15*l.* to 20*l.* per acre per annum, but may be much improved by judiciously laying out 200*l.* more in better levelling that part next the sea, and carrying a larger supply of water to it, which might be easily done without prejudice to the other meadows.

This, perhaps, is one of the most beneficial agricultural improvements ever undertaken; for the whole of the Freegate Whins is composed of nothing but sand, deposited from time to time by the action of the waves of the sea. Never was 1000*l.* more happily spent in agriculture; it not only required a common sewer to bring about this great change, but a resolution in the proprietor to launch out his capital on an experiment upon a soil of such a nature.

Since the making of the Freegate Whins into water meadows, Mr. Miller has levelled and formed forty acres more of his arable land into irrigated meadow, worth, before the formation, 9*l.* per acre per annum. It will only require a few years before these meadows will be as productive as the former; for it is evident that the longer water is suffered to run over the surface of grass land the greater quantity of fertilizing substance will be collected; therefore, as the water is so very superior in quality to all other water, a speedy return for the capital laid out may be expected. The expense of keeping these meadows in repair is from 10*s.* to 15*s.* per acre per annum, which is more than double the expense of keeping water meadows in repair in general.

It by no means, however, follows, as a necessary result of any contemplated improvement in irrigation, that the water should previously undergo a chemical examination. There are many other modes by which the farmer can form a pretty correct conclusion as to the fertilizing properties of the water he proposes to employ.

The surest proofs, says Mr. Exter, of the good quality of water (and the observations of this gentleman will be readily confirmed by the irrigators of the southern counties,) as a manure, are the verdure of the margin of its streams, and the growth of strong cresses in the stream itself; and wherever these appearances are found, though the water be perfectly transparent, the occupier of the soil through which it flows may depend, in general, of having a treasure, if he is attentive to it; but that this is not invariably the case, and that there are instances where a good water will not improve the herbage of certain soils, is proved by the following account (and there are several other cases with which I am acquainted) of the meadows of Mr. Orchard, of Stoke Abbey, Devon. These two meadows are situated on the side of a hill, their aspect nearly south—the superstratum a fine rich loam, from eight to ten inches deep, on a substratum of strong yellow clay. No difference whatever can be seen by the naked eye, in either the upper mould or the substratum, or in the herbage growing on the surface of them; except that, in the lower part of one, a few rushes appear, in consequence of some small springs which rise near them, but the water from them is not sufficient to render any part of the land poachy. At the head of the two meadows is a large pond, formed by the collecting of some small runs of spring water rising near it, and which is also improved by the wash of a small farm-yard adjoining, which, of course, must add to its efficacy as a manure. When this water is thrown over one of the meadows, it produces the richest herbage in abundance, and this field is regularly mowed for hay; on the other meadow, though repeatedly tried, it produces no good whatever. (Ann. of Agr. vol. xxx. p. 206.)

This result is attributable to the superior tenacious, retentive quality of the substratum of the lower field, or of some chemical difference in the composition of the soil; and although almost any description of soil is adapted to the formation of water meadows, those of a heavy clay description are generally the most unsuitable, those of a light or peaty kind are better, and those with a sandy or very absorbent gravel substratum still more so. There are some of the most celebrated water meadows on the banks of the Kennet of this description, and many of the best on the banks of the Wiltshire Avon have a mass of broken, porous flints for a subsoil. Those near Edinburgh, irrigated by the city drainage, rest upon the sands thrown up by the sea.

It is evident, therefore, that it is as important an object in the construction of these meadows to secure a ready and rapid exit for the flood-waters, as to procure, in the first instance, a copious and fertilizing supply.

The farmer is generally well aware of the injurious effects to his meadows of suffering the water to remain too long on them. He watches, therefore, with much care, for the first indications of fermentation having commenced, which is evinced by the rising of a mass of scum to the surface of the water—putrefaction is now beginning in the turf, and he knows very well that if the water is not speedily removed, that his grass will be either

materially injured, or entirely destroyed; he hastens, therefore, to open his water-courses. There are some soils in the vicinity of Standen in Berkshire, however, of so porous a quality, they need not any drains to empty the water-courses; and, in fact, in many instances, the farmer does not even require them: after a few hours all the water is absorbed by the soil; and yet these lands, with hardly six inches of mould above the gravel, are amongst the richest of water-meadows; the roots of the grasses penetrate readily into the gravel, and the earliest and sweetest grasses are produced on them.

Almost any description of grass will flourish under proper management in water meadows. Those whose soils consist of peat resting on sand or on sandy loam, with a substratum of chalk or gravel, generally produce the meadow foxtail (*Alopecurus pratensis,*) the brome-grass (*Bromus arvensis,*) and the meadow-fescue (*Festuca pratensis,*) on the tops and sides of the ridges. The furrows and sides of the drains are usually tenanted by the creeping-bent, the hard feseue, the rough stalked meadow grass, and the woolly soft grass. In those water meadows, whose soil consists of a sandy loam on a clay subsoil, the chief grasses are commonly the creeping-rooted soft grass, crested dog's-tail, the meadow barley, and the sweet-scented vernal grass. But some grasses change their appearance in a very remarkable degree, when exposed under favorable circumstances to the influence of the flood waters. This fact is strikingly exemplified in the case of two small meadows situated at Orcheston, six miles from Amesbury in Wiltshire, denominated from their great produce, "the long grass meads." "These," says Davis, "contain together only two acres and a half, and the crop they produce is so immense, that the tithe hay of them was once sold for five guineas." Much discussion took place amongst the Wiltshire farmers, as to the nature of the crop of these meads, before it was at last shown that the greatest part of their herbage consisted of nothing else than the black-couch, or couchy-bent, the *Agrostis stolonifera*, one of the worst of the grasses or weeds which haunt the poor, ill-cultivated arable soils.

It is a very general, as well as correct conclusion of the English farmers, that the grass and hay of water-meadows is not so nutritious as that of the permanent pasture lands. The difference, however, is not so great as is commonly supposed. The late Mr. George Sinclair determinated this experimentally, and he is no mean authority with regard to all that relates to the grasses.

He obtained from the rye grass (*Lolium perenne,*) at the time of flowering, taken from a water meadow that had been fed off with sheep till the end of April, of nutritive matter, seventy-two grains; and from the same weight of this grass, taken from a rich old pasture, which had been shut up for hay about the same time, ninety-two grains. From the same grass from the meadow, that had not been depastured in the spring, one hundred grains. And from the same grass, from the pasture which had not been fed off, one hundred and twenty grains. All the grasses, in fact, where their growth is forced by the application of either liquid or solid manures, are found to contain nutritive matter in diminished quantities —this, too, was determined by Sinclair. From four ounces of a very rankly luxuriant patch of rye-grass, on which a large portion of cow dung had been deposited, he obtained of nutritive matter, seventy-two grains. From the same quantity of the same grass, growing on the soil which surrounded this luxuriant patch, he obtained one hundred and twenty-two grains.

And in a second trial, the same species of grass, on a soil entirely destitute of manure, afforded, of nutritive matter, ninety-five grains. On the same soil, excessively manured, the grass afforded only fifty grains. In these experiments, the plants were of the same age, and were examined at the same stage of their growth. (Hortus Gram. 384.)

With regard to the construction and management of water meadows, there are many practical works of the highest authority to which the farmer has ready access, and, in the following observations, therefore, I shall merely very briefly paraphrase the accounts given by Mr. Davis and others, of the practice of irrigation in the southern counties. In this, however, even since the time that Davis wrote, there has been a great and steady improvement. The land is better levelled, the slopes more evenly preserved, the water-way, aqueducts, and hatches, better constructed, and in many of the more recent improvements in the valley of the Itchen in Hampshire, the sliding-water doors are regulated by a cogged wheel turned with a moveable winch, so as to render them safe from alteration during the absence of the meadow-keeper.

The management of the Wiltshire and Hampshire water-meadows, as well as it can be briefly described, is as follows:—In the autumn, the after-grass is eaten off quite bare, when the manager of the mead (provincially the drowner) begins to clean out the main drain, and the main carriage, and to "right up the works," that is, to make good all the carriages and drains which the cattle have trodden in, so as to have one tier or pitch of work ready for drowning. This is immediately put under water, whilst the drowner is preparing the next pitch.

In the flowing meadows this work ought to be done, if possible, early enough in the autumn to have the whole meadow ready to catch the first floods after Michaelmas; the water, being the first washing of the arable land on the sides of the chalk hills, as well as the dirt from roads, is then thick and good; and this remark as to the superior richness of the flood waters, is one that is commonly made in Berkshire and other parts of England. The length of the autumnal watering cannot be precisely stated, as much depends upon situations and circumstances; but if water can be commanded in abundance, the custom is to give meadows a "thorough good soaking at first," perhaps for a fortnight or three weeks, with an intermission of two or three days during that period: and continue for the space of two fortnights, allowing an interval of a week between them. The works are then made as dry as possible, to encourage the growth of the grass. This first soaking is to make the land sink and pitch close together, a circumstance of great consequence, not only to the quantity, but to the quality of the grass, and particularly to encourage the shooting of new roots, which the grass is continually forming, to support the forced growth above.

While the grass grows freely, a fresh watering is not wanted: but as soon as it flags, the water must be repeated for a few days at a time, always keeping this fundamental rule in view, "to make the meadows as dry as possible after every watering, and to take off the water the moment any scum appears upon the land, which shows that it has already had water enough."

Some meadows that require the water for three weeks in October, and the two following months, will not, perhaps, bear it one week in February or March, and sometimes scarcely two days in April and May.

In the catch-meadows, which are watered by springs, the great object is, to keep the works very dry between the intervals of watering; and as such situations are seldom affected by floods, and generally have too little water, it is necessary to make the most of the water, by catching and rousing it as often as possible; and as the upper works of every pitch will be liable to get more water than those lower down, a longer time should be given to the latter, so as to make them as equal as possible. (Davis' Agriculture of Wiltshire, p. 125-7.)

In Berkshire they first flood their water-meadows about Michaelmas; these are situated principally on the banks of the Kennet. The first flooding they deem the richest in quality: this they keep on the land for about four days, then they dry them for about a fortnight, and after that the water is let on for three or four days more; those meadows which are the most readily dried are the most productive. There are none more so, in fact, than those which have a porous, gravelly, or broken flint bottom, from which the flood-water readily escapes, almost without drains. They begin to feed their meadows with sheep about the 6th of April, and continue feeding till about the 21st of May, when the meadows are again flooded for a crop of hay; the land is then flooded and dried alternately for three days until hay-time.

The number of acres of land in Wiltshire under this kind of management has been computed, and with a tolerable degree of accuracy, to be between fifteen and twenty thousand. Some considerable additions, however, have been made to the water-meadows of the district since this calculation was made. (Davis' Wilts., p. 122.) About the same number of acres are formed into water meadows in Berkshire, and a still larger number in Hampshire. No one has attended more carefully to his water meadows than Lord Western, on some of those situated on the London clay formation in the Blackwater Valley in Essex, a soil of all others, perhaps, from its tenacity, the least adapted to their successful formation, and his testimony is very important—"There is an old adage," says his lordship, "that water is the best servant in agriculture, and the worst master. Water has in itself intrinsic value, distilled through chalk, lime, or marl, it acquires a portion of their qualities, though preserving the most perfect transparency, and, coming down in torrents and floods, it carries along the finer particles of earth and manure from the mountains, or higher grounds, into the valleys; hence, of course, it is that the valleys derive their fertility, and the value of the meadow has been originally created by an accumulation of wealth from the hills." (On the Improvement of Grass-lands, pp. 5, 14, 23.)

"In descending the Jura mountains, which divide France from Switzerland, the very first pasture you find on the descent evinces the value placed on the mountain floods by the inhabitants of those districts; and, accordingly, every stream is sedulously directed and conducted over the pastures in a most skilful manner. The very washing of the roads in hasty rains is also attended to, and applied to the same purposes." This system of catching the uncertain flood-waters is known amongst farmers by the name of catch-work, and though highly valuable, yet they deem it infinitely less important to them than irrigation, which is watering (generally five or six times a-year) from a certain and ever-accessible head of water, as a river, &c. And yet Lord Western's testimony is decisive in favor of even one catch-flooding; for he observes, when speaking of the expense of constructing the requisite little channels to disperse the flood-waters over the grass—"In many cases it will be trifling, in some cases considerable; but when the farmer reflects that one winter's flooding will do more in many, I may say in most cases, than thirty loads an acre of the best rotten dung manure that can be laid upon his grass lands, he can hardly shrink from some considerable expenditure." If, then, the effects even of a catch-flooding with water are so great, how infinitely superior are the advantages capable of being derived from a regular constant supply of the enriching foul waters, like those issuing from the drains of a large city, which is even now most successfully employed near Edinburgh, but worse than wasted in the case of London. Whatever may be the value, in an agricultural point of view, of the solid contents of the London sewers, yet, to me, the absolutely liquid portion, for the purposes of irrigation, appear at least equally important.

There is no agricultural question, therefore, of more consequence in a national point of view, than that of the improvement of the soil by the practice of irrigation; for, in its prosecution, all the rich organic and other matters diffused through the rivers, which would otherwise be carried into the sea, are saved to agriculture. This is not, therefore a question like that attending most other modes of fertilizing the soil, merely transposing manure from one field or district to another: but it is the absolute recovery, as it were, from the ocean, of a mass of finely divided enriching substances, constantly draining from the land. It is the effectual diversion of a stream which is ever steadily impoverishing all cultivated soils, and which unnoticed, and in too many instances deemed worthless, gliding into the ocean, is almost the only drawback to the steadily increasing fertility of our country.

GYPSUM.

From the Genesee Farmer.

Josiah Bordwell, of South Hadley, Mass., has four acres of pasture ground, and applies to it annually one thousand pounds of gypsum. The same application, and at the same rate, has been made 35 years in succession. On this lot he pastures annually one large yoke of oxen, one horse, two cows, and some years three cows. Prior to the use of plaster, Mr. B. says it required at least

six acres of this land to afford as much feed as he has obtained from one acre, by using plaster.

He has also a piece of mowing ground which contains four acres. Two crops of hay are taken from it regularly. On this ground he uses plaster of Paris freely, and applies a top-dressing of manure. His annual product of hay is fully sixteen tons.

For the Farmers' Register.

ADDRESS ON THE FORMATION OF THE AGRICULTURAL SOCIETY OF ESSEX.

At a meeting of the farmers and planters of Essex, convened at Tappahannock, on the 28th March, 1842, for the purpose of forming an Agricultural Society, the following address was delivered by their countryman,

JAMES M. GARNETT.

Friends and brother farmers:—Few things have happened to me, for a long time past, which have gratified me more, than to find so many of you desirous to establish an agricultural society, and to be the individual invited by yourselves, to address you on the occasion. To be thus honored is, of itself, a circumstance which, I confess, has given me much pleasure. But I assure you with perfect sincerity, that my highest gratification arises from the reflection, that although our good old county has done many good things in her day, none I believe has ever rendered her so much real, substantial service, as she will almost certainly derive from the association which I earnestly hope you have all come prepared to establish. In every part of our own country where similar societies have been formed, and well managed, their good effects have soon become manifest to the most careless observer; and the experience of all foreign countries has borne ample testimony to the same facts. Still, we Virginians have not appeared generally well disposed to avail ourselves of these associations, however strong and conclusive their benefits appear, to all who will give them an attentive consideration. In fact, the members of our class every where, but especially in our own state, have always appeared to me less inclined than any others to combine into societies, and co-operate for their mutual benefit; and yet, none surely require it more. For our legislatures have always acted towards us, as if we alone could never be in need of that aid, which has scarcely ever been sought from them by any other class without being granted. Hence the greater necessity of striving by co-operation to help ourselves if we will persist in neglecting to use the means—always in our power—of obtaining legislative aid. These means are as perfectly simple, as they would be efficacious. We have only to substitute *real* instead of *pretended* friends for our legislators, and the work would be speedily accomplished. But in the absence of all effective legislation in our favor, and whilst we fail to seek it as we might, there are no means which appear to me so well calculated to supply the want of it as agricultural societies. They greatly accelerate the acquisition of that knowledge of our profession which is but slowly gained by solitary study and practice, even where we are really zealous in the pursuit of it. They furnish a cure for that self-conceit, so highly injurious to such of our brethren, as believe themselves too wise to be taught; by placing them in a situation to be convinced—where the disease has not gone too far to be cured—that others know more than they do. They serve to excite that "*esprit du corps*," which causes us to take a just pride in our profession, and in which our class is so deficient. They draw closer those bonds of fraternity which should always unite us indissolubly together. They greatly promote social intercourse; and thereby tend powerfully to mitigate, if not entirely to cure those animosities and bitter hatreds, with which party-spirit never fails to poison the hearts of all who give themselves up to its influence. In a word, agricultural societies are, so far as my experience enables me to judge, the sources of unalloyed good to all who become zealous members thereof. And who can doubt it, that will reflect but for a moment on the nature and all pervading influence of that great cause, which it is the special object of agricultural societies to promote. A celebrated German agriculturist, whose late work on "Organic Chemistry in its application to Agriculture and Physiology" has become one of the text books in agricultural science, has summed up in a single sentence the chief circumstances which render this cause so great, and of such vital interest to all mankind. His words are, "There is no profession which can be compared in importance with that of agriculture; for to *it* belongs the production of food for man and animals; on it depends the welfare and developement of the whole human species, the riches of states, and all commerce." This single sentence contains what might be expanded into volumes of illustration and praise; but I confidently trust that all of my brother farmers who now hear me are sufficiently apprized of the essentiality of our profession to all the best interests of our country, not to require such a diffuse eulogium to recommend it farther to our special regard.

If it were my sole object to endeavor to make you fall in love with your profession, I might paint for your imaginations only the pleasures of agriculture, the green meadows, the verdant lawns, and glowing landscapes of well cultivated, highly productive fields, with which an all bounteous Providence hath enabled the cultivators of the soil to solace and regale both their animal and intellectual natures. Such an attempt would be both easy and delightful. But on the present occasion, I feel myself called on not only to exhibit some of the most striking advantages of agriculture to individuals and communities, together with the most practical means of improving it, but also to trace a warning chart of the shoals and quicksands, the rocks and barren wastes, that too frequently impede the progress of the husbandman, exhaust his substance, and mar his happiness. This, although the most necessary, is by far the most irksome part of the duty, which I shall now attempt to perform. In my endeavor to execute it properly, should I be so fortunate as to suggest any hints which may prove practically useful, I shall deem myself amply rewarded.

In regard to the general advantages of agriculture, both to individuals and nations, no one probably is so ignorant as to require much to be said

to him in the way of explanation. There are none, for instance, but must know, that the yeomanry of a country constitute the pay-all-class; that they furnish the means of subsistence, both in peace and war, to all other classes; that all taxes for the support of government, or any other public exigency, must ultimately come out of the land, and be drawn from it by the labor, skill and industry of those who own and cultivate it. How vastly important then, how absolutely necessary is it, that they should possess all the knowledge of their profession, both scientific and practical, which it is possible for them to acquire, since not only their own welfare, but that of every other class—nay, of the community itself of which they are members, vitally depends upon the extent of this knowledge, and the persevering diligence with which it is applied to all the various branches of husbandry. Yet, most strange to say, ours is a profession which multitudes of us appear to think may be practised successfully, as it were by instinct, for many, very many take it up without the slightest previous study or experience, and take it in high dudgeon, even if the oldest farmers venture to question their qualifications. What renders this misconception the more surprising is, that it is never made in regard to the simplest of all trades and callings, that even cobblers and tinkers are required to serve some apprenticeship, before they undertake to act as master-workmen. But *our* farmers make no such preparation, no, not they; although theirs is a vocation, which if estimated by its national importance, and the great variety of knowledge essential to the attainment of excellence therein, must certainly rank among the highest in society.

As to the means of our improvement in husbandry, although some small capital in money, or its equivalent, is generally deemed necessary to begin with, a capital in agricultural knowledge, sobriety, honesty, industry, and economy, is still more essential; for without these, and a good stock of them too, it is folly for any man to expect to reach a high standing in his class. To do this, he must carefully shun all extravagance, he must be just and fair in all his dealings, indefatigably diligent in all his farming operations, giving to each its due share of attention; perfectly sober in his habits, that he may be always fit for business as well as an example of sobriety to all under his command; and to crown the whole he must neglect no means within his reach to improve himself, both in the knowledge and practice of his profession. One of the most obvious of these means, especially for those who have no access to agricultural books, nor time to study them, is to become a member of some well managed agricultural society. All of these associations meet once or twice a year; and thus furnish opportunities for each member to learn, if he pleases, all that may be known by the rest, within the limits of their particular society. Here, then, any individual member who seeks information may acquire, in a day or two, more knowledge of his profession than he would probably gain in some years, by relying entirely on his own practice at home, unaided either by books, or conversation with farmers more experienced than himself. Moreover, his attendance on these meetings would be apt to inspire him with a more humble sense of his own agricultural knowledge, than most of us are apt to have who mix so little with our brethren as to have no opportunity of comparing our own acquirements with theirs. The neglect to do this is almost as sure to infect our minds with an overweening notion of our own knowledge, as the neglect to till our fields is, to fill them with noxious and pestiferous weeds. In fact, without a considerable degree of humility, there can be no desire to learn, for there is no consciousness of deficiency, no belief hardly in the possibility that others know more than we ourselves do.

Another advantage in attending the meetings of an agricultural society is, that we are apt to feel a livelier interest in our vocation; and to take a more enlarged view of its national importance, than we would ever possess, if we wilfully neglected, as too many of our brethren are apt to do, to look a little beyond our own thoughts for the means of improvement. To effect this most rapidly for our minds, frequent interchanges of opinion relative to every thing connected with our profession is quite as necessary, as the frequent application of fertilizing substances is to accomplish it for our lands. And he who neglects to avail himself of this all important fact, well deserves to live and die under the fatal curse of *that* ignorance, which self-conceit, and its constant companion, obstinacy, are sure to fix upon all who give themselves up to their influence. Most truly may it be said of any such man, "there is more hopes of a fool than of him."

I have said that one of the means of our improvement in husbandry is, to become an active member of some agricultural society. But much depends upon how this society is constituted, and how it is managed. To enable it to effect well the purposes for which it was established, all who become members should determine, and persevere in that determination, annually to do something more towards its support and improvement, than merely to pay punctually their subscription, although *this* should ever be deemed an indispensable duty. Each cultivator of the soil, however poor he might be, may certainly do this; for it does not require that a man should be rich to make and report accurate experiments on a small scale; and such experiments have often been known to result in the most important discoveries. In fact, some of those which have been most beneficial to mankind have been made by men comparatively poor. Again, members who are not cultivators, but belong to other professions and callings, may aid the cause very much, by always attending the meetings of their society, and exerting whatever influence they may possess to render it popular. We are all more or less creatures of imitation, and generally prone to do what we see others do. Of course, if many unite zealously in any pursuit, especially if it be one for the promotion of that greatest and most essential of all arts, the art of agriculture, others will assuredly follow, some merely for company sake, but numbers probably from the laudable motive of bearing a part in the general effort to do good.

Another means highly necessary to the beneficent operation of agricultural societies is, to establish and to cherish correct opinions, as to the nature and objects of the premiums which are usually offered by them. These are to excite a greater degree of fair, honorable competition, in

the various branches of husbandry than would probably arise without them; not, however, for the special benefit of the individuals who may engage in it, but more effectually to promote and improve the particular branch, wherein the competition is produced. This should always be borne in mind by the competitors, and they should always deem it highly dishonorable to become, what an old member of our Fredericksburg Agricultural Society has most aptly called "*prize fighters*," that is, men who compete for those premiums solely for the sake of the paltry gain, and who almost always withdraw, if disappointed in their sordid objects. If they do not take this step, which at once displays the baseness of their motives, they may always be known by the gross abuse which they never fail to utter against the committees that have decided against them. This is an evil to which all agricultural societies, that give premiums are constantly exposed; and there is none from which they should labor more to free themselves. But nothing, I believe, would do it, unless perhaps it were made a part of the constitution of every society to expel a member for accusing any committee of partiality, in fulfilling a duty which they can have no possible motive to abuse. On the contrary, they have every inducement which can operate upon men in such situations to discharge this duty faithfully, since they cannot possibly gain any thing by violating it. Possibly the disgrace of expulsion might deter these "prize-fighters" from indulging their ribaldry, when disappointed in obtaining a premium, although such a remedy is at least doubtful; for the men who would be most apt to offend in this way, have generally too little sense of honor and justice, to regard what a truly honorable man would consider a disgrace. The only thing which they really dread is either corporal or some other punishment that would take money out of their pockets. No agricultural society can ever derive the smallest benefit from them, and none should ever be admitted, if their characters could possibly be known beforehand.

I have said more, perhaps, on this subject, than some of you may think there was any necessity for saying. But if you form a society, as I sincerely hope you will, your members will be peculiarly fortunate, indeed, if they do not soon find among them some such disturbers of their peace and prosperity as I have described.

Let the foregoing remarks suffice to show how we may improve in our profession, by becoming members of some agricultural society. But this alone will be far, very far from making us good farmers and planters. We must not only learn all we can from our brother members, and be always ready to adopt their practices, whenever we see good reason to believe that they are better than our own, but we should dread, as we would poison, that pride and pertinacity of opinion which all our brethren are so apt to contract, who neither study their profession as a science, nor seek any other means to improve in its practice, than such as their own unaided thoughts may possibly suggest. This entire self-dependence for an increase of knowledge, soon swells into a degree of preposterous, arrogant self-conceit, which as effectually shuts the mind against the access of all truth, all improvement, as a good cork shuts a bottle from the admission of air. With hearts and intellects properly prepared for the acquisition of knowledge, by a proper distrust in our own acquirements, and a desire to increase them, both of which will be augmented by associating with men better informed than ourselves, we shall certainly be led to seek, not only *this* source of improvement in our profession, but we shall resort also to agricultural books.

Some of these, in the form of periodical papers, have now become so cheap, that every man who is not actually a pauper may easily furnish himself with at least one of them, as the cheapest costs only a dollar a year, although a single paper will often be found to be worth many dollars to him who will read it attentively. This remark I have very often heard, and from men too who were once silly enough to laugh at every thing in print, on the subject of husbandry, until they became thoroughly convinced of their own folly and obstinacy, in neglecting to ascertain for themselves, what agricultural books and papers really were. They then discovered that they were precisely the same with oral communications on the same subjects. The only difference being, that the first is the experience of farmers recorded *in print*, and the latter the experience, often of the same farmers, imparted *by word of mouth*. The facts, communicated in either way, must be exactly of the same value, as must also be all the speculations, either oral or printed, which may be blended with them; and stupid, indeed, beyond measure, must he be, who could not so distinguish between them, as to derive benefit from the facts, if worthy of regard, and avoid injury from the speculations, if they were either inconclusive or utterly visionary. This matter is now so generally and well understood, that the individual who ventures to sneer and scoff at what he is pleased to call "book-farming," will rarely fail to be thought a vain, conceited ignoramus, however he may escape being called so to his face. He can no longer thus disguise his own ignorance and aversion to learning, nor pass himself off, even among his most illiterate brethren, for a farmer of superior knowledge and skill in his profession; but must go for what he really is, an arrogant, opinionative boaster, utterly too lazy to study, too self-conceited to believe others better informed than himself, and far too proud to confess it, even if forced to see and to feel his own inferiority. I have said the more on this topic, because I verily believe that an overweening confidence in our own knowledge is the besetting sin of our class, owing to so few of us ever studying our profession as a science, to the solitary lives we generally lead, and to our consequent ignorance of the daily improvements which are constantly making in all the various branches of husbandry. Of these we must keep ourselves well informed, either by reading or frequent interchange of opinions, on all subjects connected with our profession, but both are best; or we must be content to suffer all the penalties and deprivations of our wilful ignorance.

Another method of improving in our husbandry is one which few, very few pursue, although it really seems to me demonstrable that it would greatly contribute, not only to our knowledge, but to our wealth. It is, to lay out whatever clear profit, (if any,) which we can make from our

farms, in augmenting their fertility, rather than in adding to their size. Any man, who will take the trouble to make the calculation, may very soon convince himself of this fact, so highly important to all agricultural improvement. For instance, is it not perfectly plain, that if we increase our crops merely by increasing the surface cultivated, we must add a proportionate increase of labor and other means to make them, and of course have our expenditures and income relatively the same as before? We therefore gain no additional clear profit, although we gain not a little additional trouble in managing this increased labor. Yet almost every farmer, who has it in his power, continues to add negro to negro and acre to acre, whenever an opportunity offers; and thus not only fails to augment his own net income in the smallest degree, but actually contributes, by his perpetual buying up more and more land, without improving what he already owns, to depopulate the neighborhood in which he lives. In this way it has happened that in many parts of Virginia a single proprietor will now own many thousands of acres, which half a century ago, or within a shorter period, were divided into several distinct farms, each of which sufficed for the comfortable support of a different family, who might still have been living on them in abundance, if the money, time and labor, which it cost them to move and to form other far distant settlements, had been judiciously expended in improving the homes of their ancestors, and the lands which gave them birth. No man can doubt this, who knows, half as well as I do, how capable these lands are of being so improved as to yield even ten or twelve times their present average product. For it is a fact within my own knowledge, that many of our Virginia farms formerly produced per acre crops which exceeded what they now yield full as much as I have stated, whilst others which were almost barren, when I first knew them, having fallenin to the hands of improving proprietors, instead of the land-skinners who previously owned them, are now producing ten, fifteen, and even twenty-fold as much as they did in the hands of those deadly enemies to all agricultural improvement. It may be prejudice, but I confess I have always considered such men among the very worst members of society; for, although they increase for a time the means of human subsistence, it is solely for their own exclusive benefit, without the slightest regard for the general welfare or their own posterity; and under an absolute certainty of ultimately impoverishing their own state, by destroying the productiveness of her soil to the utmost extent of their power. To this deplorable situation they have reduced thousands upon thousands of acres of our once fertile soil. But with a knowledge of its capacity for improvement which most of its present owners possess, what should hinder them from restoring these lands to their former state, or to one still more productive, since many of them are now known to contain in their marl deposits the natural means of effecting this restoration? The only obstacle in regard to these farms is, either that sheer laziness in their proprietors, which causeth the sluggard to be continually saying to himself, "*yet a little sleep, a little slumber, a little folding of the hands to sleep,*" or else it is an inveterate habit of putting off from day to day what they wish and mean to do; a habit, by the way, which is utterly incompatible with every thing like good farming. Procrastination has been called "*the thief of time;*" but it is infinitely worse: it is the slow but deadly poisoner both of mental and bodily energy, rendering the best resolutions entirely abortive, and the greatest physical powers nearly as useless to us as if we did not possess them.

Our population, computed by the square mile, and compared with that of the northern and eastern states, falls very far short of theirs, although we have greatly the advantage of them both in soil and climate. Do any of you wish to know the reason? It is simply because *they* have been constantly and most industriously laboring to improve *their* lands, whilst we (with few exceptions) have been as constantly treating *ours* in a way that could not well have been worse, if we had actually been laboring with might and main to wear them out. I will not say that such was the design of our treatment; but the effect has certainly been the same as if malice prepense had instigated all our proceedings. No state pride, no attachment to the places of our nativity, no affection for kindred and friends, no devotion to agriculture, as the great source both of individual and national prosperity, has had any such influence over us, as to save our good old Mother Virginia from the almost hopeless impoverishment to which a vast portion of her soil has been reduced by the neglect, the abuse, and constantly exhausting culture of her improvident, reckless children. The deplorable consequence of this has been, that multitudes of them seem so disheartened by the prospect before them, as almost to have lost the power of making the necessary exertion to better their condition, although there are now very few neighborhoods, and no counties which do not afford some highly laudable examples demonstrative of what rapid improvement may be made of our exhausted soils, simply by persevering industry and labor, judiciously applied to the various processes by which worn out lands may be restored to a highly productive condition. There are no soils so poor as not to furnish to their owners more or less of such materials as may be easily converted into manure; for such are all substances that will rot. Moreover, a very large portion if not the greater part of our lands below the head of tide-water, abound with marl, that has never failed to restore land to fertility, wherever it has been judiciously applied. On farms destitute of marl, the numerous substances convertible into manure, aided by lime, plaster of Paris and red clover, will soon effect the object, and that too without any great outlay of cash, if we could only content ourselves with a small, gradual beginning. But our great misfortune is, that very few of us, even among those who have least property, have yet learned to practise upon the good old Scotch proverb—"*Many a little makes a mickle.*" Hence it happens with such persons, that because they cannot command money and labor enough to make, as it were, by a hop, skip, and jump, all the improvements they wish, they will not attempt to make any; but go on from bad to worse, until emigration presents itself as the only remedy for an evil which seems incurable, merely because no effort has been made to cure it. How long such num-

bers of our brethren will continue to labor under and to suffer from an infatuation so deplorable, so paralyzing, GOD only knows; but so long as they do, a man might as well preach to so many deaf adders, with the expectation of doing them any good. They seem infinitely to prefer lounging away their time at any place of public resoft, where such dronish idlers as themselves are most apt to congregate. There, perhaps, they interchange very profound condolences about "the hard times," without the least apparent consciousness of their own participation in creating them; or, should a tippling shop be at hand, their favorite occupation generally is to settle the affairs of the nation therein, and ever and anon to wash down their patriotic effusions with copious libations of whisky and brandy to some political idol. In the mean while their farms are left in a great measure to take care of themselves, and to regain fertility, if that be possible, by almost total neglect. Happy for our country, and most happy for such persons themselves would it be, if by any means they could be cured of their self-destructive habits, and converted into industrious, frugal, persevering farmers. The whole appearance of our own state, as well as of many others, would soon be changed by it; we should cease to hear of any farm being deserted from its supposed incapacity to support its owners; and it would not be long before our good old Virginia would begin to look and to feel something like what she once was in her most prosperous days.

There is still another important change essential to our improvements in husbandry, which *all* of our farmers who have young sons are deeply concerned in making. It is, to abandon the preposterous practice of crowding nearly all of them into the professions of law and physic, instead of trying to make good farmers of them; than which there is no more honorable vocation, nor any one that has so many considerations to recommend it to our regard. Ask any man whom you please, if he does not feel certain that we have an overstock both of doctors and lawyers, and he will certainly answer *yes*. But still we are constantly adding to the number, as if there was really no other honest pursuit by which they could make a living. In the whole compass of supposition, there is (at least in my opinion) but one which will reconcile this practice to common sense; and I hardly think we shall find any gentleman of either profession willing to admit it to be true. It is, that to multiply lawyers and doctors is to increase sickness, diseases, and litigation. If adding to the former would diminish the number of the latter, as it certainly would, provided the doctors and lawyers were all masters of their profession, and strictly honest as well as conscientious, *then*, assuredly, any addition to the number of either must unavoidably lessen the total amount of income to be divided among them all; and consequently ought to prevent any considerate parent from devoting his son to the study of either law or medicine, at least so long as both professions continue to be so overstocked as they *are and have been* for many years past.

The following brief illustration of the difference between the sources of income, upon which lawyers, doctors and farmers necessarily depend, must place this matter in a point of view, the justness and truth of which no man in his senses can deny. For instance, the *farmer's thrift* depends upon the thrift and the health of all other trades, professions, and callings, for *all* are *his* customers, inasmuch as *he* produces the necessaries of life which all want, and must have, in proportion to their appetites and means of buying. On the other hand, the *lawyer's thrift* depends upon the number of disputes and quarrels in regard to property, of injuries to persons or character, and of frauds and crimes which *may* be committed within the limits of his practice; for, be it remembered, that none of these things are necessary incidents to society, although of too frequent occurrence. And the *doctor's thrift* depends on either the real or supposed unhealthiness of the persons among whom he lives. If few or none are litigious, few or none slanderous, few or none perpetrators of fraud or crime, the lawyer is in some danger of starving, instead of growing rich; whilst the physician is in quite as bad a predicament, should there be little or no sickness, few or no diseases. True it is, and most lamentably true, that such a condition of society cannot reasonably be anticipated; but we may confidently cherish the hope of a nearer and nearer approximation to it, if the great, the vital causes of *temperance* and *popular education* continue to advance, and to gladden the hearts of all true lovers of their country, as we now have every reason to believe they will. And so sure as they do, just *so sure* will fewer instead of more doctors and lawyers become necessary. But the well being of every community will always require some of each profession, and I am one of the last men who would maintain a contrary opinion. I have too great an esteem, too sincere a regard for the worthy men of both classes, to say any thing in disparagement of either good doctors or good lawyers, for I am happy to believe that many of them are among my best friends. All I wish is, to remind my brothers farmers of the old proverb, that we *may* have too much, even of a good thing; and to beseech them to recollect, that in our own profession there is still more ample room for more, many more recruits.

In making this assertion, I am fully sustained by the facts which our late census has disclosed in regard to our own state. But at present, I will refer only to those which more immediately concern our own comparatively small county. According to the authority which I have consulted, Essex contains only 280 square miles, or 168,000 acres. By the last census, our whole population in this county amounts to no more than 11,309 persons. Now supposing that three-fourths of this number are engaged in agriculture, and that only two-thirds of them are capable of labor, which seems to me a fair estimate, as none under ten and over seventy years of age ought to be counted, we shall have no more than 20 and a small fraction, who can properly be called agriculturists, to every square mile, which is a little over three to every hundred acres! This, I think, amounts to a demonstration, that we shall be in no danger whatever, for many, many years to come, of being overstocked with farmers and cultivators of the soil. Nay more, it proves most clearly, that if we consult the interest of Virginia husbandry, and the great national interests partly dependent thereon, we shall use all the fair means in our power, to induce our sons

to devote themselves to agriculture, in preference to any other profession. One of the most obvious of these means is, to improve our own knowledge of it, both by study and practice; for then we shall have the great advantage of addressing their understandings, by the all powerful agency of example, as well as by that of precept. When a parent heartily works by both, seldom indeed will he fail to succeed with his child in any thing; for among all the admirable lessons of wisdom, which we derive from that great store-house of soul-saving knowledge, the Holy Scriptures, there is not one of more practical utility, not one of more vital importance, than *that* which inculcates upon parents the absolute necessity of first doing as they would wish their children to do, before they have any right to expect good conduct from them. By the same divine authority, we are assured, that if we will bring up our children in the way in which they should go, they will not depart from it. If, therefore, any of my brother farmers who now hear me, desire that their sons should follow their own profession, as I certainly think they ought, these sons should be brought up to it, educated for it, and taught to love it. The very effort to do this, will benefit yourselves full as much as it will benefit them; for there is nothing which will operate so effectually, to make us sensible of our own want of instruction in any particular branch of knowledge, as the attempt to instruct others therein. This will soon expose to us our own self-conceit, without a consciousness of which, nothing can ever inspire us with an efficient desire to seek more information in regard to our profession, inasmuch as we foolishly imagine ourselves already possessed of all that we need have.

Should any of my hearers be in this self-complacent, opinionative condition, a condition so delectable to the indivldual himself, but so truly rediculous to all others who behold it, I beseech him to try earnestly, if it be but for a single day, the experiment of teaching one of his sons the principles and practice of agriculture. And if this one effort did not so far open his eyes to his own ignorance, as to cure him effectually of all overweening confidence in his own knowledge of his profession, I should not hesitate to affirm of that man, that he was doomed to live and die, without any farther acquaintance with husbandry than he then possessed. To expect *him* to improve would be quite as hopeless a thing, as to look for it in one who was entirely destitute of all the faculties which render man an improveable creature.

Before I conclude, permit me to make one or two other suggestions which I deem very important to the successful operation of an agricultural society. The first is to make every member, as far as practicable, a *working member*, instead of what is generally called "a sleeping partner." To do this, the best method, I think, is one lately suggested by Mr. Ruffin, editor of that excellent paper, "The Farmers' Register." He recommends that the constitution of every agricultural society should require each member, who is a farmer, to make annually and report the results of at least three experiments, on a scale suited to his means, in regard to some disputed questions in agriculture; that at least half the funds of the society be offered in premiums for the best of these experiments; and that a fine of one dollar he imposed for every one that each farmer fails to make. This would keep all the members on the alert; and would certainly elicit, every years, some useful information which might be beneficial to all.

My next suggestion is, that in every case where premiums are offered, it should never be forgotten, that the sole purpose which they ought to aim at accomplishing is, to obtain the greatest results at the least expense of labor and materials. For instance, if the premium be offered for the greatest produce per acre, of any crop, let it always be made an indispensable condition that authenticated statements should be produced, not only of the quantity, but of the quantum and kind of manure, and labor expended in making it. Again, if the premium be offered for stock, let it be required that the whole process of rearing and fattening be stated in a manner equally well authenticated and particular. The same regard to economy should regulate all other premiums, not only to enable poor farmers to compete for them with a fair prospect of success; but because every agricultural society should make it one of the chief objects of its efforts to promote and encourage economy in all farming operations whatever. Without a due regard to *this*, no farm can properly be said to be well managed, since the net profit may be reduced to nothing, however large the crops, unless the various expenses in making them be constantly kept within the narrowest limits compatible with the progressive improvement of the farm, and the regular increase of the owner's clear income.

And now, my friends, I will no longer detain you from organizing your society, but conclude with the full assurance, that if properly sustained, it will rapidly improve you, both in the knowledge and practice of your profession; it will strengthen your conviction, that no other vocation contributes so much to independence, so much to health, plenty, and competence, if not to great riches; that it will enable all industrious, frugal owners and cultivators of the soil to provide well for themselves and families, to give much to them that need; but above all, to impart to their children that sound moral and religious education, which is the best, *incomparably the best legacy* a parent can leave to his child; for it ensures to him, so far as human means *can* do it, happiness both in this world and the world to come.

TO GUARD SHEEP FROM BEING KILLED BY DOGS.

From the American Agriculturist.

Perhaps one of the greatest obstacles to the keeping of sheep has been the savage destruction made among them by worthless curs kept throughout our country, for no other reason, that we could ever imagine, than to gratify the fancy of their owners. If these animals were kept constantly chained up where they could do no harm, no fault would be found; but when suffered to run at large and become public destroyers, it is quite another affair, and we hold every one justifiable, nay, a positive duty on their parts, to shoot all dog prowlers, without any more hesitation than they would a mad wolf.

The importation of the large Spanish shepherd dog has been recommended, as he will invariably attack and kill any dog that approaches his flock, but this would be an expensive and troublesome measure, and it would take a long while to breed a sufficient number of them here, before they could become generally effectual. During our recent visit to Kentucky, we learned a very simple, and at the same time profitable way of guarding sheep, which is this:—

Put a few active cows, with their sucking calves, in the same pasture with the flock—five would probably be enough for several hundred sheep, to which add five active three year old steers, and as many more two year olds. Take a gentle dog into the field, with a long light cord about his neck, the end held in the person's hand accompanying, to keep him in check, and then set him on to the sheep. The cows, thinking of their offspring, will immediately advance to head the dog and guard the calves, the steers will follow their example, and the sheep retreat behind them. Thus continue a few times, till the steers are well broke in, when the cows can be taken away and they will inevitably gore any dog to death that dare persist in attacking the flock. However brave a dog may be in other matters, the moment he attacks the sheep, he seems to be conscious of the ignominy of it, and as if conscience stricken, becomes a coward, and will run at the slightest approach from other animals.

When steers arrive at the age of four years, it is generally requisite to remove them to better pasture than is required for sheep, for the purpose of fatting, or they are wanted for the yoke. But just before this is done, add as many two year olds as you wish to remove of the older ones, and the three year olds left will soon break in the young ones, and so the system can be annually kept up as long as requisite.

For these guards, we would recommend a small active race of animals, with sharp horns, as they would more effectually gore and toss a dog, and it will require a small active animal to support itself on feed, that is generally as short as sheep pastures usually are. The hardy red cattle of New England would be admirable for this purpose, or indeed any active native animals, those chosen from the hill or mountainous districts would be best, as more fleet and pugnacious when required. We are told by hunters, that it is thus the wild buffalo protects himself, on the vast plains of the west, from the attacks of savage bands of wolves, and they not unfrequently afford protection to whole herds of deer. Mr. Hart, of Kentucky, defended the deer in his park by the elk, a single pair of which, would be sufficient to guard hundreds of them, as they would run down the fiercest dog in a few minutes, and cut him in two by perhaps a single stroke of the sharp hoofs of their fore feet.

IRISH POTATOES AND OATS IN NEW LAND.

From the N. H. Monthly Visitor.

We have heretofore endeavored to impress upon our readers the value of our rough mountain lands. There yet remains much land in the upper counties of this state considered of little value that may be made valuable. In conversation with Winthrop Folsom, Esq., of Dorchester, a few days ago, we gathered the following facts:

Four or five years ago he purchased a lot of eight acres of uncleared rocky land, for which he gave three dollars per acre: this land, covered with a growth of wood, he cut down, cleared, burnt and fenced at an expense of eight dollars per acre—making the cost of land eleven dollars per acre. It was planted with potatoes: he charged himself one dollar for every day's work done, and twenty-five cents per bushel for the seed potatoes. He called the potatoes raised that year on the ground worth sixteen cents the bushel; and he found the gain of this year's operations, above the cost of land and clearing and the expense of seed and labor, to be ninety dollars, or nine dollars per acre. The next succeeding year he raised on the same ground four hundred bushels of oats: since that time the same land has produced a decent crop of hay, and is now good pasture land.

Mr. Folsom has more recently purchased a lot of three hundred acres of these wild lands at the price of one dollar an acre. On this land he has commenced clearing. His first clearing was fifteen acres at the cost of eight dollars an acre. His first crop of potatoes on this ground was 3,100 bushels. Three thousand bushels sold to the starch manufacturers at one shilling the bushel, brought $500—one hundred bushels drawn home worth $17—making the year's product $517. The cost of land, fencing and clearing, $160, would leave the clear gain of this year's operations on these fifteen acres, three hundred and fifty-six dollars. The second year, (which was the last year, when the crop suffered much from drought) the same land produced 475 bushels oats, worth at 50 cents, 237.50, and 14 bushels of rye worth $1.00, making $251. After the two crops were taken off, it would not be high to value this land at five dollars the acre.

The method of planting the potatoes is extremely simple. After the ground has obtained a good burn, the planter proceeds with a bag of cut potatoes swung over his shoulder—strikes a sharp hoe into the ground through the outside root turf—covers with the foot, making each hole at the distance of about eighteen inches in the row, and the rows three feet apart. Planting in this way makes three fair days' work to the acre, worth $2.25. The digging of an acre of potatoes at four shillings per day, six days' work, is worth $4. No hoeing during the season is necessary; and so well does the seed operate in the ground, that the vines often grow to a sufficient size to cover the land. The whole expense of raising potatoes on burnt ground, after the ground is cleared, Mr. Folsom informs us, will not much exceed six cents a bushel.

SOWING CORN BROADCAST.

From the American Farmer.

In the Farmer of April 20th, I observe over the signature of "Ledyard" some inquiries in relation to sowing corn broadcast, and the best method of securing the crop.

Having tried the experiment last year I offer a

few suggestions as the result of my experience. I sowed a few acres with a view of ploughing it in as a green crop for the benefit of the soil, but was tempted, by its luxuriant appearance and a scarcity of other provender, to make use of it for that purpose. The quantity of seed sown was about 2 bushels per acre. Perhaps in a very rich soil, the use of a smaller quantity of seed might be attended with the objections named in the remarks which follow the inquiries of your correspondent, viz.—"the tendency of weeds to check its growth."

After the ground is well harrowed and sown, I would recommend your correspondent to make use of the cultivator to cover the seed—which by the way I have found an excellent improvement for covering seed wheat. The ground should then be rolled smooth, which is all that is necessary to be done until the time of harvesting arrives. My crop was cut just at the time the grain began to harden—and the lower leaves of the stalk were becoming shrivelled. The fodder was suffered to lay on the ground for a day or two until the stalks had become sufficiently wilted, to be made use of as *bands* for tying the fodder in *small* sheaves; after being bound the sheaves are set up in small shocks of about one dozen sheaves each, and *capped* by placing one sheaf on the top as a crown to shelter the shock from rain. In this state it remained until perfectly *cured*, when it was carted off and stacked up in a convenient place for feeding. I find this far superior to the "whate straw" of our friend Paddy, for it don't require *any thing at all.* E. P.

P. S. With respect to the proper time of sowing, I would suggest that the usual time of planting corn is the most fit season where the crop is to be used as dry fodder.

Balt. Co., April 21st, 1842.

THE FRUIT CURCULIO. FRENCH RECEIPTS TO GUARD AGAINST THE BLACK WEEVIL.

To the Editor of the Farmers' Register.

Hillsborough, N. C., April 8th, 1842.

I send you the following fact, in confirmation of the view you have taken of the application of marl or shells to the soil around fruit trees. I see that Mr. Downing, of Newburg, takes a similar view of the matter, and recommends clay.

The fact to which I allude is this. A few years since, while at the house of a very intelligent farmer, of Lincoln county in this state, I was forcibly struck with the lively and *clean* appearance of his plum trees, which were then loaded with fruit. On inquiring of his mode of treatment, he remarked that the only secret in the case was, to set them out by the *road side*, (as his were) or along some path, where the ground would be trodden down as hard as possible.

It would appear therefore, that the rationale of the thing is not to be sought in the shell marl or in the clay, but in having such a hard pan of earth around and under the trees, that the insects which infest them cannot get a lodging place in the soil.

This subject reminds me of numerous receipts, against various insects which are so troublesome to agricultural and domestic economy, that are found in a French work, entitled "Secrets concernant les Arts et Métiers," published in 1790, in four volumes. In reading it over lately, it occurred to me, that possibly some of the secrets for destroying insects might be valuable; and if so, that I would be doing good service to furnish them for your paper. I have no means of knowing whether they are useful, and will therefore send you a specimen, and let you judge for yourself. If you think them worth publishing, let me know, and plenty more of the secrets shall be forthcoming.

—

Mode of protecting grain from the weevil and other insects.

Soak a woollen or linen cloth in water, and after wringing it out, spread it over your grain. In two hours the weevils will be found attached to it.

Against weevils.

Take as much lie as is necessary for washing over your granary, in which boil a quantity of ox-gall, (an excess need not be feared,) and wash your granary with the mixture.

Another mode.

Spread branches of the elder over your grain heap, and the insect will retire to the walls, from whence it will be easy to sweep them up and burn them. To make the odor more effective, the leaves and branches may be bruised.

Another.

After the grain has been removed from the granary, spread a large quantity of the branches of the box over the floor, and let them remain till the grain is put in; when they should be put along the walls, partitions, joists, &c., as well as on and around the grain.

Another.

Let your barn be emptied and swept, after which let a flock of sheep lie in it for six weeks. The odor of these animals will kill the weevils. Should they make their appearance again, the following method should be adopted:

Another.

Place in the middle of your barn, or granary, a large iron pan of burning charcoal, closing the doors and windows tightly. Cut three or four old shoes into small bits and throw them upon the fire, to which may be added the hoofs of horses, &c. The fire should be kept up for three or four hours. The strong odor of this smoke will infallibly kill the weevil, &c. This process should be repeated every year before housing your grain. It also drives away rats and mice.

[I think this process would be pretty sure to kill men!]

Another.

Sprinkle the floors and walls of your granary with a decoction of garlic, well steeped in a sufficient quantity of salt water. The odor of this is no sooner diffused than the weevil dies or goes away.

Wormwood, rue, savory, lavender, green coriander, and all plants of a strong odor have the same effect.

Another.

Melt Burgundy pitch, and by means of a bit of tow make a slight coating of it upon the shovels used for stirring the grain heaps, and then rub them over with the oil of petroleum. After turning the grain with them two or three times, the weevils will disappear. It will be necessary to renew the oil and pitch whenever they become detached from the shovels.

The above are some of the first "secrets contre les insects and les animaux nuisibles," and are a fair specimen of the whole. Some of the processes I should judge to be inert. You can perhaps determine whether *any* of them are valuable. Very respectfully and truly yours,

M. A. Curtis.

[The foregoing recipes all apply, it is presumed, to the *black weevil*, a small insect of the beetle tribe, which has wings, but is not known to fly, which lives through the winter, and infests mills and granaries which have grain always in them, so as to furnish a regular supply of food to the insects. The moth or flying weevil, which is so much a greater depredator on the crops of negligent farmers in lower Virginia, is not common in France, even if certainly existing there. Cleanliness in barns and granaries—cleaning out all the old grain, and all the grain some part of every year, is the best preventive against the black weevil. And the flying weevil, though even a more formidable foe, usually may be perfectly guarded against by care and attention, with a proper knowledge of the habits and especially the mode of propagation of the insect. See a long article on this subject at page 325, vol. i. Farmers' Register.—Ed. F. R.

GRASSES AND GRASS CULTURE OF FRANCE.—CONTINUED.

Translated from "Le Bon Jardinier," for the Farmers' Register.

Luzerne, Medicago sativa.—The great advantages of this plant, the most productive of all of those employed in artificial meadows, are well known. It prefers good land, deep, sound, well cleansed, and manured the year before it is sown; but it succeeds in many soils of different natures, but not on those which are grassy or have clay on the surface, or are very poor. If it is manured at the time of sowing it is necessary to do it with compost well pulverized. The considerable product and the great durablity of lucerne, owing very much to the facility with which the roots penetrate the earth to a great depth, should have the effect of bringing it into universal cultivation. In situations that are either low or near woods, or that are from some cause subject to late frosts, it is prudent not to sow it until May. In some cantons it is not uncommon to see it postponed until the summer. In dry and light lands it may be sown early in the autumn with barley or rye. The ground having been well prepared the seed should be sown with that care which their fineness renders necessary. To keep up the product of a lucerne field, and to prolong its durability, it is proper to top-dress it in the winter, or in the commencement of spring, with well decomposed manure or with the ashes of turf or coal, or what is still better, with ground plaster, a substance which produces on all plants of the leguminous family the most astonishing effects. Plaster should be sown in a spell of damp weather when there is a prospect for rain; it may be done not only in the latter part of winter, before vegetation has commenced, but also in the spring and summer when the first and second growths have begun to be devoloped. Few persons are ignorant of the frequent accidents that occur from grazing the aftermath of clover and lucerne; when cattle are permitted to go on it before the dew has been dissipated, or after a rain, they become inflated, and often perish. Farmers, therefore, cannot be too careful in this respect, as well as in employing it green in the stables; for if given there whilst wet, or in too great quantities, it will occasion similar accidents. They sow forty pounds of seed per hectare.

Luzerne rustique, Medicago media.—There grows naturally in France a lucerne similar to the cultivated species, but which differs from it in its disposition to elevate its stalks and to grow more erect, and in its being more tardy to put out in the spring. This is the variety which I here call the luzerne rustique. From many observations that have been communicated to me, and from those which I have made myself, I have reason to believe that it is more hardy and less difficult to suit with a proper soil than the *medicago sativa.* It is very vigorous, and often produces stalks more than four feet in length. Athough the experiments that I have made are not sufficiently advanced for me to form any certain opinion, yet this plant appears to me to possess sufficient interest, to render it my duty to point it out to farmers, and to call their attention to it. It is an intermediate between the common lucerne and the *Lucerne faucille,* (*Medicago falcata,*) and I think, without being certain, that it is the plant designated by Persoon, in the Synopsis Plantarum, as the *Medicago media.* The *Luzerne faucille,* the culture of which has been frequently recommended, has always, in the attempts that I have made, appeared very inferior to the variety of which I write; but as it grows naturally on the poorest lands, it deserves to be submitted to the proof of culture. After continued attempts for many years I have determined to give up entirely the luzerne faucille. Although it grows naturally on poor chalk lands, yet sown on these same lands, the plants near one another do not grow with any of that vigor that they possessed when growing isolated here and there. Another objection is, that the stalks have a decided tendency to lie upon the ground. Finally, to obtain any decided profit from it on poor land, it is necessary to ameliorate it very much; in which case the medicago sativa is far preferable. Although the *Luzerne rustique* succeeded with me, yet it did not

seem to possess the decided advantages of the ordinary variety. But Mons. Descolombiers, who has also brought it into cultivation, informs me that with him it "grows vigorously, dry, and not deep, and not watered, in the midst of a crop of *brome* and yarrow; and, in short, that it most justly deserves its name," (the hardy lucerne.)

Lotier Corniculé, Lotus corniculatus.—Little is as yet known of the culture of this lotus, but it certainly deserves to be studied. In meadows, where it is frequently found, it is valued; although, from the shortness of its stalks, hay cannot be made of it. It is good for pasturage, grows readily in dry lands, and maintains its vegetation during the summer. It is suitable for most purposes for which the white clover is employed, and is often preferable, particularly in adorning grass plats, where its yellow flowers have a very pleasing effect. Unfortunately there are so few seed, and they are so difficult to collect, that the culture can never be widely extended.

Lotier velu, Lotus villosus.—This species resembles the last so closely, that many botanists have looked upon it as only a variety, but it is a decidedly distinct species. It will grow on lands more moist, is more erect, and is better supplied with leaves. From its great longevity, which I have observed both in its wild state and in experiments that I have made, I have no doubt that the *Lotus villosus* would be a good plant to cultivate, alone perhaps, but at least in mixtures, to form natural meadows. The grain is much more abundant than in the other variety. It should be sown in March and April, about sixteen pounds to the hectare.

Lupin blanc, Lupinus alba. It is only in the south of France and in Italy that the excellence of the manure that this plant affords, when turned under whilst in flower, is known. The grain soaked in water is a good food for cattle, and it is used when green as pasture for sheep. One of the chief advantages of the lupin is that it prospers on very poor land, such as a coarse sand, a ferruginous soil, or a poor clay, and affords means by which to enrich them; it is rather sensible to cold, and should not be sown in the climate of Paris until towards the middle of April.

Lupuline, Medicago lupulina, has the leaves and appearance of a clover, and for that reason is called sometimes *yellow clover*, or *black clover*, which names are derived, the first from the color of the flower, the last from that of the husk of the seed vessels. Its culture has for a great while been confined to the neighborhood of Boulogne, but it has been lately spread considerably, into the interior of France. It is valuable because it will grow on inferior lands. It is biennial, and can occupy in the cultivation of rye lands the same place that clover does on wheat lands. The forage that it affords is not abundant, but is fine and of good quality, and very acceptable to cattle. But the lupuline may be more advantageously used as pasturage for sheep than by converting it into hay. It is generally sown in March, at the rate of thirty pounds of seed per hectare.

Pois gris, Pisum arvense, as forage, is very much esteemed, particularly for sheep. It is an annual, and is of very rapid growth. It is good to sow on fallow lands, and if cultivated properly, it will reduce them into excellent order for the ensuing grain crop. Moist wheat lands are best suited to the Pois gris, but it will also succeed on rye lands when they are in tolerably good heart. It is well to manure it, when it is to be followed by a crop of grain. They usually sow it broadcast, and cut it sometimes when it is in full flower, but more generally when the most of the pods are formed, and dry it for winter use. Two spring varieties are the most common. One is early, and is sown in March; the other is not so forward, and is not sown until May. A third variety, called the *Pois gris d'hiver*, which is sown in the autumn, has lately been brought into cultivation, and seems to be very desirable, particularly in arid soils. Pois gris is put generally in those foragenous mixtures called *dragées*, (meslin or mixed grass.)

Sainfoin, Hedysarum onobrychis. The good qualities of the sainfoin are too well known to render it necessary for me to point them out; but I may insist with much utility on the faculty that this plant possesses of succeeding on indifferent lands, whether sandy and gravelly, or very chalky, and on its merit in ameliorating them very much. Among the examples of its ameliorating effects, I will mention that furnished me by Mons. Yvart, as having taken place on his farm, *Maisons,* near *Charentou;* he has with sainfoin converted into wheat lands fields of gravelly sand, from which he could previously, in spite of all his efforts, only obtain rye. The demonstration of these effects has been so plain, and the example so influential, that by degrees a great part of the lands of the plain of Maisons has by the same means undergone a similar transformation. When one lays out a meadow of sainfoin for mowing, and wishes to preserve its durability for as long a time as possible, the grazing the aftermath should be sedulously avoided, particularly in the first years. There are cases, particularly in indifferent ground, where they sow it expressly as pasturage for sheep; it will then last but a short time, but is still a great resource for food. They sow it generally in the spring, but sometimes in the autumn, and almost always with a grain crop. The variety, *Sainfoin a deux coupes*, or *Sainfoin chaud*, first propagated in the environs of Peronne, by Mons. Pincepré de Buire, has been considerably extended into France in a few years. It is more vigorous, is stronger and more productive than the ordinary sainfoin, and it yields a second abundant mowing, whilst the other only produces an indifferent aftermath. Many farmers who have adopted it have informed me that it required better land than the ordinary variety. As it is to be presumed that this is only a variety in some manner artificial, obtained by being cultivated for a great while in good lands, persons who sow it in indifferent lands should from time to time change their seed, to obtain constantly produce decidedly superior to the ordinary sainfoin. Its leaves being much larger, and harder, and the seed much coarser, it is necessary to sow it thicker. Mons. Tirris, proprietor at Forcalquier in the department of Lower Alps, has brought about an agricultural revolution, not only on his domain, but in all the adjacent country, by the introduction of a grass that he calls the Spanish sainfoin, and which he believes to be the veritable *sulla.** But this plant, of which he sent me a

* See the *Annales d'Agriculture*, July, 1828.

few seed, has proved to be the *Sainfoin à deux coupes*, of which I have been writing. The real *Sainfoin d'Espagne*, *Hedysarum coronarium*, has not yet, I think, taken a place among our forage-rous plants, although it would probably succeed in our southern department.

Grand tréfle Normand.—Mons. de Laquesnerie, a learned agriculturist, discovered this variety of clover, and had the kindness to send me some seed of it. The experiments that I have made with it, have shown me how accurately he described to me the details of this plant. The Norman clover is much taller than the common trefoil, and generally yields but one crop, which, however, is often equal to two mowings of the ordinary clover, its hay is coarser, and the plant appears to be more durable. Is this clover to be preferred to the ordinary variety? I will not undertake to resolve this question, which indeed may be susceptible of different solutions, in different soils and under different circumstances. It has been so recently introduced, that it is impossible for me to form a correct opinion as to its value, but I have thought proper to point it out to farmers as an interesting subject for experiments and observations.

Tréfle d'Argorie, is another variety of red clover, which has been for some years cultivated in Switzerland, and which appears to possess some important qualities. I have been assured that it will last for four or five years, from which character it has been called the perpetual clover. I have not myself been yet able to verify this fact, but what I have observed in it, and what appears to me still more interesting, is the very decided disposition that it has to increase its stalks, and that it is at least fifteen days more forward than the common variety of clover. It is also very vigorous, and has long leaves. If the qualities which have shown themselves in this instance, in this variety, are confirmed by numerous proofs, and if it preserves them without any apparent depreciation, for many successive generations, it will be certainly a desirable acquisition to agriculture.

Tréfle incarnat, *Trifolium incarnatum*, affords only a single mowing, and its hay is inferior to that of the common clover; yet there are few varieties of the trefoil that can be rendered more serviceable in agriculture. Cultivated almost without expense, without care, and without deranging the order of the crops, it yields a most abundant crop of hay. It possesses, in a very eminent degree, the merit of being precocious; and, whether as pasturage or to be cut green, affords resources for feeding cattle before any other plant. They sow this clover in August, or early in September, generally on the stubble fields, after having turned them over by a light working with the plough or extirpator. This working, or rather moving the surface of the soil by repeated harrowings, is necessary for the clean seed, which it is necessary to cover with care. But when it is sown in the pug, it is sufficient to spread it on the stubble without any preparatory working, and to pass a roller over it. This is a very good plan, particularly when one wishes to sow it directly after harvest. One may perceive by this with what facility the agricultural condition of countries destitute of grass, particularly those where the triennial rotation is in use, could be ameliorated by the cultivation of this plant. Let a farmer for example sow a portion of his oat stubble, say a fourth part in it. About the first of May, if he wishes to cut it green, from the 15th to the 25th, if he wishes it for hay, all can be taken off, and he will then still have time to work it properly. Thus, without any derangement, he will have obtained from this part of his stubble field an abundant crop of hay between the harvest and the time for ploughing. The *Trifolium incarnatum* is very valuable to sow in places where the red clover is missing, which is done either by spreading on them the seed in the pug, or by raking in the clean seed. Almost all wheat and rye lands, provided they are sound, will produce this clover. I have sown much, and I have seen much sown on soils of very different natures, and with me it has only failed on lands that were excessively chalky, and that were very much spewed up by the frost. Sometimes our winters destroy this plant, but that accident is very rare, and although there is an instance of it in 1820, yet that should not prevent its culture from having a rapid progress. They sow thirty or forty pounds of the clear seed to the hectare, and when it is sown in the pug it requires from ninety to a hundred pounds.

Tréfle de molineri, *Trifolium molinerii.*—They designate by this name a wild tréfle incarnat, which grows commonly in the centre provinces, and in the north of France. It is chiefly distinguished from the cultivated variety, by the much paler color of its flowers, which are at first of a dingy white, and afterwards assume a pale red, or flesh-colored tint. But this difference, although general, is not constant, and although there are some other apparent differences, as the length of the heads of the flowers, &c., I do not know that they are sufficiently marked to permit these plants to be botanically separated. However, notwithstanding their close botanical conformity, there is a very decided difference in their dispositions, and in their mode of vegetating. First, the *Trifolium molinerii*, grows spontaneously in the north, where the other has only been introduced by culture; it is also slower in the germination of its seed and in its developement; it has less disposition to send forth stalks; and I have seen it last two years, whilst the *Trifolium incarnatum*, sown by the side of it on the same day, was entirely dead at the end of the first summer. That which first induced me to try the *molinerii*, and to compare the analogy of that and the *incarnatum*, was that, having often met with it about Paris, I thought that, accustomed for a long succession of generations to our climate, it would be more hardy, and resist more constantly the cold of our winters, than the southern race, and that the hay crop would thereby be rendered more certain. I have as yet obtained no decisive proof of this, and I should say, on the contrary, that it appears to me in many respects inferior to the cultivated variety. I have, however, thought it my duty to place before farmers this account of these experiments, because they have a really useful design. The *Trifolium incarnatum*, is a plant of so much value in agriculture, that it will be of great interest to our country to obtain a variety that will not suffer from cold. In a work recently published, the *Trifolium molinerii* and the *Trifolium incarnatum* are presented as being one

and the same. That may be true, botanically speaking, as I have said above, but in culture it is otherwise. I have cultivated the first for many years, and I have made comparative experiments with them both, of many acres at a time, and have always found decided differences between them. I am not singular in this opinion; many practical men, who have tried both of these plants, have come to the conclusion at which I had arrived. I will mention among them that distinguished agriculturist, Mons. Descolombiers, whose opinion on this subject coincides entirely with mine. A third variety has been announced and recommended, by Mons. Juery, of Toulouse, it is the *Tréfle incarnat tardif.* Its name indicates its quality; it is sown and cultivated like the common variety, and comes in later. According to accounts published at Toulouse, this clover does not commence to flower until the other variety is out of bloom. But in the experiments that I have made, both in the environs of Paris, and at Gatinais, I have found only the difference of five or six days in the blooming of the two varieties. Perhaps I may not have received the decided species, or this difference may be owing to the difference of the climate, which has more effect on the early than on the later variety. Be that as it may, the culture of it has made considerable progress in the south. Mons. Descolombiers, has informed me that in the department of Allier, he and his brother-in-law, Mons. the Marquis Saint George, have sown much of it, and have derived positive advantages from it. If one is obliged to resow, with the tréfle incarnat, a clover field that is too thin, this late variety should be very much preferred, as it accommodates itself better to the mowing of the red clover, than the ordinary variety.

Vesce commune, Vicia sativa, is an excellent annual forage, is suitable to render waste lands useful, and offers many other considerable advantages; the most important of which is that it may be seen as late as June on strong and moist land, and in that manner affords an opportunity of providing against a scarcity of hay, if the crop in the meadows should fail. There are two main varieties of tare, that of the spring, which is sown in March, April or May, and sometimes in June, and that of the winter, which is sown in the autumn. Both prefer good land, which is rather stiff than light. A considerable quantity of moisture in the winter will destroy the winter tare; it will grow more readily on dry and light soils than the spring tare, which, on the contrary, delights in moisture, particularly when sown late. It is necessary to cover the seed with care, to protect them from the pigeons, which are very fond of it. They cut the hay whilst the plant is in blossom, or when a part of the pods have commenced to die, or indeed after their entire maturity, if one desires the grain rather than the hay. The tare is a very good food to give green in the stable or to graze, but it should be used with the precautions that are necessary to be taken with all grasses that are very succulent and nutritious; for given too damp and too abundantly, it affects the cattle not less dangerously than clover that is too moist. The ordinary quantity of seed that is used is about 26 decalitres per hectare. It is well to sow a little oats or rye with the tares to support them.

La Vesce blanche, Vicia sativa alba, is less common than the two preceding varieties, but it is just as valuable as forage, and in addition, its white and larger grain affords a means of subsistence to man. In many cantons the inhabitants use it to make pea-soup, or use its flour in their bread, mixing it in small proportions with wheat flour. Many other varieties of tare might be usefully cultivated.

Ajonc, Ulex Europeus, Furze, is an extremely thorny shrub, a native of the uncultivated lands of Europe. The abundance and the durability of its yellow leguminous flowers would render it an appropriate ornament for pleasure grounds, did not the sharp and hard thorns at the ends of the branches and leaves render it objectionable. It is very good for making inclosures, which are almost impenetrable, for which purpose, after having sown it on the sides of ditches in March, they protect its young shoots from the attacks of cows and horses, which will eat it with great eagerness; which circumstance first led to the cultivation of the furze, in districts which were destitute of meadows and artificial pastures. They sow about 30 pounds of seed per hectare, on indifferent, but well worked land, the second year they begin to cut the young shoots before the blooming of the plant, which takes place from January to March, after that year they cut it in the winter as they require it. They give it to the cattle, after having crushed the thorns under a mallet or a stone. This plant has also the advantage of furnishing very good fuel, and they grow it expressly for that purpose in a part of Normandy. The furze is said to be a fertilizer. They get very good crops of wheat after it, which is owing without doubt to the custom of burning the stumps and roots, on the land when they extirpate it. The small variety of furze, *Ulex nanus,* common about the environs of Paris, serves whilst it is young to nourish the cattle of the poor, and in the autumn furnishes them with the means of heating their ovens.

Lenthille à une fleur, Ervum monanthos, is cultivated in some parts of France, for its forage and its farinaceous grain. Without being very productive, it possesses qualities which render it valuable in some cases; for example, it succeeds in indifferent lands, where one can neither raise the tare on the pois gris. Its small and climbing stalks require the support of oats or rye, which must be sown with it. Its grain is used as that of the *lathyrus sativa* in making pea-soup. They have made great use of it for many years about the environs of Orleans, where it is cultivated under the incorrect name of *lathyrus cicera.* It is generally sown in the autumn, and stands the winter very well. I have for many years been acquainted with the value of this plant, both from the experiments that I myself have made, and from those of my enterprising neighbor, Mons. Valentin de Culloin, which are on a very large scale. The masses of forage that he has obtained from the *Ervum monanthos* and the *Pois gris,* on land that until then was thought to be incapable of producing a single truss of hay, are such as have already resulted in the immense amelioration of his farm. I cannot too earnestly urge upon farmers, who possess gravelly lands, and who are stinted in their forage, to introduce amongst them the culture of this plant, as I am

confident that they will derive very great advantages from it. I say gravelly lands, because on those of an indifferent chalky nature, on which I have tried it, it succeeds but poorly.

Ers Ervillier, Ervum Ervillia, is an annual, and is common in some of our southern departments. The vetch, without being tall, affords very good hay, and also produces a large quantity of grain, which is given to pigeons, but with care, as it is very heating. The hay participates largely of this quality, and should be given in very small quantities to horses, and only when one wishes to give them ardor, or to prepare them to undergo very severe work. I have been assured that this plant eaten green by hogs was certain death to them. The grain as food for man is also suspected, and persons should guard against the mixing it in meal for bread. One may see that I wish less to recommend this plant, than to warn persons against the danger of it, of which they may be ignorant. The vetch can be sown in the autumn but it will succeed better when sown in the spring. Turned under in flower, it is thought in some cantons to be the most efficacious of all vegetable manures.

Féverolle, Faba vulgaris equina.—The great utility of this bean is generally known. Its culture may be very much ameliorated in stiff and clay soils, where indeed it is but little known. It affords a good forage, whether cut when in flower or when the pods have been formed. They often use it in the composition of *dragées* and of *hivernages* (mixtures of leguminous grasses, and oats or rye, intended for green food,) but it is the grain which renders it most valuable. They sow the féverolle from the first of March to the middle of April, either broadcast or in rows; the last method is generally preferable, but especially when the soil is compact, when working is almost unnecessary for the plants. The cultivation of the bean crop is desirable, not only because it is one of the least exacting crops, but because it is the best of all preparations for wheat on clayey soils. Turned under whilst green, the bean is one of the very best of vegetable manures.* All of the varieties, of which there are many, can be useful in farming; but this particular variety is the best for turning in. The *highland bean*, which I obtained from England, where it is much esteemed, is very valuable on account of its productiveness. In the south of France, the bean stands the winter very well, and is very often sown in the autumn, but in the north, where the ordinary variety is destroyed by the cold, or at the least very much injured, they sow a variety which is more hardy, and which they call the *Féverolle d'hiver*.

Rue de chevre, Galega officinalis. Those who see the rue in gardens, where its bunches are so vigorous and thrifty would conceive a favorable idea of it and desire to try it on an artificial meadow. But although recommended in many works, it unfortunately appears from different experiments that this grass does not suit cattle, because they refuse to take it as hay, and will not eat it in the pastures. If no positive experiments have been made on this subject, (and I know of none that have been made,) it is desirable that they should be made, as it is known that cattle often at first will refuse food that is excellent for them, and will become very fond of it after many trials. If such should be the case with the rue, it would be valuable on account of its great vigor its considerable product and its remarkable durability. They sow about 40 pounds of seed per hectare.

Gesse cultivée, Lathyrus sativus, is an excellent animal forage. It is particularly fine for sheep, and is less heating than the vetch. It succeeds readily on lands either stiff or light, if they are quite moist. They sow it in March and April, and sometimes, in the south of France, in the autumn. They cut it either when it is in bloom, and feed it green, or after the first pods have commenced to die, and make hay of it, or they permit it to mature entirely, that they may obtain the grain. In many parts of France the inhabitants make very good pea-soup of it.

Gesse velue, Lathyrus hirsutus. Mons. the Baron de Wal, of Baronville near Givet, informed me of the success which he had with this plant as forage. Sown in the autumn it appeared to him to rank in utility with the winter vetch. I tried it, at his request, and find it very hardy and foragenous, but more backward than the vetch. It produces a considerable quantity of seed, smaller than those of the vetch, but which appear to be good food for pigeons, but when the forage is cut green, as it ought to be, the most of the seed remain in the pods. If this plant could be brought into the list of those that are to be cultivated usefully for cattle, it would be a great conquest over the useless weeds of our fields, for the *Lathyrus hirsutus* is nothing else at present.

Petite gesse, Lathyrus cicera, is a winter variety, and is as hardy and perhaps more hardy than the winter tare. It furnishes an excellent food for sheep, but is too heating for horses, and should be given to them only with great care. I should also say that its grain is an extremely dangerous food for human beings. In some cantons the people make meal of it to mix with other flour, in very small portions, for bread. It does not appear to produce any bad effect, if the proportion is very small; but in years of scarcity some persons having increased the proportion, some have died and others have been stricken by an incurable paralysis. I have been assured of this by the excellent and indisputable evidence of the late Mons. de la None, surgeon at Bourqueil, and it has been confirmed by Mons. Deslandes in an article published in the Journal des Maires. It is particularly necessary to give this fact publicity, as the culture of the *Lathyrus cicera* has extended very much in France within a few years, and this danger has consequently increased.

(I have extended this translation beyond my usual length, that I might send you all of the article on "Fourrages légumineux," at once. Red and white clover, and melilot, which came under the same head, I sent you in my first selection.)

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* This fact, which is equally applicable to the various peas of this country, is, I think, well worthy of the consideration of Virginia farmers, who would, I feel confident, find it very much to their advantage to adopt this mode of using the pea, particularly as it grows with so much certainty and vigor, even on inferior land.

CORN CULTURE. BOOK FARMING. ORCHARD GRASS.

For the Farmers' Register.

I have derived much benefit, in the cultivation of my corn crop, by the use of the coulter plough recommended by Mr. J. M. Garnett, in one of the volumes of the Farmers' Register.

After the ground is flushed, and reduced by the drag log, I chequer it with the coulter plough, running as deep as I can with two strong horses. To mark the spot for the corn to be dropped, I have attached to the beam behind the coulter a small ploughshare. When the corn rises, I run the coulter plough deep on each side; and after thinning, I run the coulter plough through it one way, and cross with rank cultivators. This I repeat, alternating the ploughs and the cultivators, till I complete the cultivation. If the season be very moist and the grass becomes strong, I make the last ploughing with mould-board ploughs. This I do with some reluctance, as I am unwilling to turn the ground after flushing. I do but little with the hoe, and think but little is necessary. I am sometimes obliged to chop a rough bottom. In my neighborhood we had a continuing drought, from the middle of June to the first of August last year. The fostering rains which then fell restored verdure to the stalk of the corn, though many of the blades were entirely destroyed, and I made a good crop. The main cause, I think, was the deep shooting of the roots, by which they escaped the burning influence of the sun, during the continued drought.

I am a friend to book farming, founded on fact and experience: in proof I offer my steady adherence to the Farmers' Register. The philosophers are now pushing their theories to a great extent, and I think are disposed to mix too much chemistry with agriculture. I am by no means satisfied that the fertility of the glades, in the Alleghany mountains, is occasioned, even in part, from the evaporations of the Atlantic and Pacific oceans. I particularly distrust the philosophy of the German school, both moral and natural.

To those who are disposed to grow orchard grass, I would observe, that the crop often fails from defective seed. Those who supply the seed stores often desire to have the benefit of the hay and the seed, and gather it in its immature state. To get good seed the plant ought to be perfectly ripe, so as to serve for nothing but litter. A small piece of ground will produce much seed; from less than an acre and a half I last year gathered near forty bushels. If good seed be sown, either in March or September, it rarely fails.

I commenced my grass culture with eight acres, which I have extended to forty. The profit I think greater than I could derive from grain crops, on the same lands. I have an annual crop, and the only expense, cutting and saving the hay. The orchard grass which I sowed ten years ago is now running out, and has been followed by green grass, (Poa pratensis.) I cut a good crop of hay from it last year, and the aftermath resists the frost as well as orchard grass. My milch cows, with no other food, except when snow was on the ground, grazed on it till the 10th of December, without failing in their milk.

RUSTICUS.

Eastern Shore, Md., March 13, 1842.

DEBATE IN THE HOUSE OF DELEGATES ON THE BOARD OF AGRICULTURE.

From the Richmond Enquirer.

When the bill to provide for paying the expenses of the members of the Board of Agriculture came up on its third reading—

Mr. Strother offered a ryder providing that they should be paid for their past services, but that hereafter the Board should be abolished. He addressed the House at some length in opposition to the Board, and denied that any great focus of light would result from its labors. Who, he asked, were to constitute the Board? gentlemen, politicians, or farmers? If politicians were to form it, surely no value would result; and if farmers, what information would they convey which could not be obtained in another way? The Board met a short time since in this city, and informed us that they had turned their attention to the geology of the state and several other matters connected with its agriculture. Their first demonstration, however, was that they wanted their pay. Now, he took the position, that the information which the Board of Agriculture was designed to collect, could be obtained in a more tangible form from other sources. It was true, that the people were anxious on the subject of agriculture; yet they could gather from the papers all they desired to know, all that was useful, and all that the Board would be able to furnish. If the members of the Board would hide their light under a bushel unless appointed, if their wisdom would depart from earth with them, there would be some reason for putting them on this Board and paying them for giving it to the world. But not so, the agricultural papers were in the habit of receiving all the benefits of the information possessed by these gentlemen.

Mr. Kennedy was sorry to witness so much opposition to the measure now before the House. Especially did he regret the source whence it came. From his knowledge of the gentleman from Rappahannock, (Mr. Strother,) and that gentleman's known exemption from all that was illiberal or contracted, he had relied on him to sustain the measure. The objection urged against the measure was that it would do no good. Now, Mr. K. thought that it must be manifest to all who would take the trouble to examine into the matter. The operation of the Board was plain. It gave a stimulus and encouragement to county societies, and they afforded the means of obtaining information for the press, which re-acted on the people at large. The press, Mr. K. said, had done much, and had manifested a lively zeal in the cause of agriculture. Still, it had over and over again declared that knowledge was not to be acquired in so effectual a manner as through a report from a Board of Agriculture.

Last year a State Board was appointed. Recently it met here, not so much to give to the world the facts it had collected, as to organize a plan of future operations. They propose to establish a correspondence with every section of the state, with gentlemen of information and experience—each man giving the experience of himself and neighbors. By reference to similar boards in other states, some idea might be formed of the utility of which this one of ours would be productive. The books they had published contained

much valuable information. For the purpose of showing the benefit derived by a neighboring state, Mr. K. instanced the county of Washington, in Maryland—separated from his own county (Jefferson) only by the Potomac—a county possessing the same soil and advantages as Jefferson—exactly the same distance from market—and in fact no difference existing between the two, except that the taxes in Maryland are four times as high as in Virginia,—where land brought nearly $10 more per acre than it did in Jefferson. Nothing caused this but the system of cultivation, which resulted from the establishment of the Central Board of Agriculture.

Mr. K. said he could not let the occasion pass without expressing his deep regret, that Virginia should present such a spectacle, as she now did, of barren fields and deserted firesides. She had not improved with the time. She had not kept pace with her neighbors. She did not maintain her stand among the other members of the confederacy, and he greatly feared that she was losing the dignity of her position. It was only necessary to refer to her census and to her advertising journals, to perceive that her character, her talent and her wealth were fast leaving her and going to the prairies of the west. He appealed to gentlemen to do something to resuscitate the glory of the Old Dominion, and asked them if they were willing to stand by and see such a measure as this fall to the ground for the paltry consideration of two or three hundred dollars. On such a subject as this, he would not make an appeal to their sympathies, but to their liberality, to their sense of justice and to their intelligence.

Mr. Bayly regarded the ryder as incongruous. The bill provided for the future pay of the members of the Board, whilst the ryder repealed the bill itself. He should not vote for the ryder, though he might at a proper time be disposed to vote for abolishing the Board. After some remarks from Messrs. Strother and Bayly,

Mr. Leyburn addressed the House in support of the bill, and particularly in reply to the gentleman from Rappahannock, who, he said, seemed determined to kill the bill with hard riding —"head it or die." When he heard that gentleman denouncing this movement as a humbug, morus multicaulis as a humbug, all kinds of conventions, even the *Education* Convention as humbugs, he could not help coming to the conclusion that the gentleman himself had been a sufferer from the morus multicaulis mania. Gentlemen had said, that the papers would render sufficient aid to the cause of agriculture. Whilst Mr. Leyburn admitted their utility, he still contended that superior benefits would result from a Board of Agriculture, collecting information from every where, and affording that information to the press, to be condensed and placed in an attractive form before the people. All had heard of the American Almanac—a publication containing a vast number of important facts, and bought by multitudes of the people of the United States. Now, he thought that a Farmer's Almanac, such as they have in some of the states, gotten up by an enterprising man, and embodying the information derived from the labors of the Board of Agriculture, might succeed very well, and be of eminent service to the people.

Mr. Holladay said the question was now pending on the ryder, by which it was proposed to abolish the board. Last year, the board was established without pay—now, it was proposed to abolish it and pay its members for past services. This he considered singular. If the board ought to have been established, it should have been continued, and if so, it should be paid. He hoped gentlemen were not prepared to declare by their votes, that we were unwilling to do any thing for the cause of agriculture. Virginia was essentially an agricultural state. That was the main interest and occupation of her people. Was it not therefore our duty to do something for it? Were gentleman willing to say to the first, great, foremost interest, "we fold our arms and deny that we can aid you?" How, he asked, did the gentleman from Rappahannock (Mr. Strother) come to the conclusion, that no good would result from the establishment of this board? Did he go according to experience in his deductions? If so, where did he find proof of the inutility and inefficiency of such a board? Where was there a community, in which there was a board of agriculture, that had not improved in its soil and its agricultural productions? It was, he thought, vain to say that the propriety of the board was not demonstrated by experience. On the contrary, if we were guided by experience, why could not the same results be achieved here in our own state as elsewhere? Did our own experience show that no good had resulted?

Gentlemen had laid great stress upon the advantages to be derived from the agricultural papers. These journals were established by men who had given their attention to the subject, in its principles and details. They all coincided in declaring, that a board of agriculture should be established. As we had their advice to this effect, why not take it? The present board of agriculture was composed of men of high reputation and experience. They had testified strongly in favor of the advantages which would be derived from it. Did gentlemen here know better than they? Could they reasonably gainsay the opinion of these gentlemen, fortified as it was by facts and experience? They had no interest in the matter, but the high and holy motive of patriotism. They could derive no advantage from it whatever. They could gain nothing for their reputations, unless they did something for the state, by reforming her condition, and enhancing her agricultural interests.

The house had been told that they should be economical in expenditure. This board would cost $500 a year, but what was that compared with the benefit it was likely to confer upon the state at large? He (Mr. H.) was as much in favor of economy as any one here; still, he denounced as niggardly, the economy that would defeat a useful measure like this, for the sum of $500. He thought something should be done for an interest which paid so large a share of the taxes of the state. Let it not be said that nothing could be done for such an interest. Let an effort be made, and even if no good should result, we should have the consolation of knowing that we had made an effort for the cause.

Mr. H. again referred to the argument of the gentleman from Rappahannock, concerning the

agricultural papers, and contended that they, as had often been declared by their editors, were unable to collect the facts from the various sections of the commonwealth. To elicit the desired information from every neighborhood, the system of farming prevalent in each division of the state, to get at facts which the practical farmer will not come forward to give to the community himself, is essentially the design of a board of agriculture. The Legislature was in the habit of legislating for every interest and on all subjects. Yearly laws were enacted to take care of the terrapins, oysters, fish and wild-fowl of Virginia; *should it be said that we could and would do nothing for the great cause of agriculture?*

Mr. Crutchfield admitted the subject before the House was important, and a consumption of some little time in its discussion was excusable. He would, therefore, say a few words, though he despaired of carrying a majority with him in opposition to the measure. Agriculture, he admitted, was an important interest—the most important in the state—and if he could be convinced that it could be benefited by this measure, he should cheerfully go for it. As it was, he must call on his common sense to guide him in his conduct towards the propriety of it. He did not see why gentlemen should object to the ryder, by which the future operations of the board were to be discontinued. If so much benefit was to result from the board, why was it so slow to be perceived! Had not an effort to establish it been made year after year, and without success, until last winter, when it never could have passed, had provision been then made to pay its members? In former times, when there was a surplus in the treasury and when a majority of the legislators were farmers, all efforts to establish a board were useless. Last winter it passed without provision being made for pay, and without calling the ayes and noes. Years ago, the ayes and noes were always called successfully against it.

Mr. C. reminded gentlemen of the voluntary boards and societies which had been formed for agricultural purposes in different parts of the state. They had all flourished for a few years. There was one in Albemarle—where was it now? There was one in Spottsylvania, but it was waning away. These societies had given many speculative reports; yet Mr. C. said, that after a while they degenerated, and became like the reports of many of the school commissioners—a column appropriated for "remarks," and the whole of it blank, except the words, "nothing further since our last report." Mr. C. said he opposed the further continuance of the board, because he was convinced it would render no service to the state. Could he bring his mind to a different conclusion, poor as the treasury was, he would vote $500,000 to aid the cause. The proposition to pay the board for past services was a draft on the honor of the Legislature, which he could not consent to protest. He was willing to pay the board, and let it cease for the future.

Mr. Kinney said he was opposed to the ryder. The Legislature had done much for every other branch of knowledge but agriculture. It had established professorships of law, of medicine, and a military institute. Did the state of Virginia look now as she did formerly? We all knew her condition, and it was time that we should be awakened. We now saw the old commonwealth —once the first and foremost in the union—sinking lower and lower every day! Was it not time that we were tracing the cause of her decay, and if it were found to be her agricultural condition, to endeavor to revive that drooping interest? The proposition before the House was not new. It had been agitated for years. Several sessions ago, it was lost by the vote of one of the delegates from Albemarle, (Mr. Gilmer,) who thereby nearly lost his seat on this floor. The gentleman from Spottsylvania had referred to the Agricultural Societies in different parts of the state, and had supposed that like that in his county they were all declining or dead. He (Mr. K.) took pleasure in bearing his testimony to the benefits they had conferred, particularly those of Rockbridge and Albemarle (which, he said, was not dead, as the gentleman from Spottsylvania had stated,) with whose operations he was somewhat acquainted. As such good results had been compassed by county associations, he augured that farther and still more important advantages would be derived from a state institution.

Mr. K. said he would read from a valuable work which he held in his hand (the New England Farmer) to show what other states had done to promote the interests of Agriculture. In *Maine*, $70,000 was paid in one year for bounties on wheat. In *New York*, an appropriation of $120,000 was made to it. In *Indiana*, a Scientific and Agricultural College was established. In *Georgia*, a Board of Agriculture was incorporated. *Massachusetts* had encouraged it by causing an agricultural survey to be made, and by bounties on wheat, &c., *Maryland*, *Kentucky* and *Michigan* had all acted on the subject. *Maine* gave a bounty of 3 cents on cocoons, and 50 cents per pound on reeled silk; *Vermont* 10 cents, and *Pennsylvania* 20. Mr. K. then proceeded to speak of the culture of silk and the advantages which the state would derive by encouraging it. At present we imported largely from France, when we had a soil and slave labor which was peculiarly adapted to its cultivation.

Wherever, Mr. K. said, encouragement had been given by a state to agriculture, that state went ahead of its neighbors. He trusted, therefore, that gentlemen would not refuse this important interest the poor pittance of three or four hundred dollars.

Mr. Crutchfield said that the gentleman, who had just spoken, had referred to the prosperity of other states, and attributed it to the Boards of Agriculture. Now, he had often heard other gentlemen say that their prosperity was attributable to their internal improvements. This argument had been frequently used by the friends of internal improvement. Mr. C. said he was informed that there did actually exist at one time in this state a Board of Agriculture, with John Taylor at its head. That Board, thus constituted, was suffered to go down, when there was a full treasury. He would leave this fact with gentlemen to make their own application.

Mr. McRae protested against the ryder as incongruous and unfair. He trusted the House would vote down this insidious effort at the defeat of the bill. He bore his testimony to the advantages of an Agricultural Board, and of voluntary associations, as exemplified in his own county.

Mr. Strother coincided in the view, that agriculture was the most important interest in the commonwealth; yet, he contended that legislation had frequently been had indirectly for its benefit. What was the Geological Survey intended for, if not to benefit the interests of agriculture? That survey was carried on at great expense. Its object was to develope the agricultural resources of the state. Year after year, we had looked for something to grow out of it, and still the only fact that had been developed was that some oyster shells had been discovered on the Blue Ridge—a fact no doubt very interesting to the philosopher, but of no practical value to the farmer. The gentleman from Jefferson (Mr. Kennedy) had referred to the flourishing condition of Maryland and New York, and had attributed it to state encouragement of agriculture. Now he (Mr. S.) explained it thus: every man there had a direct interest in the soil (which was less in extent than ours) and is thereby induced to till it with more care. Here, a large portion of our labor has no permanent interest in the soil, and is therefore reckless as to the mode of cultivation. As to the allusion of the gentleman from Rockbridge (Mr. Leyburn) to his morus multicaulis speculations, he confessed he had suffered a little; yet he did not give full credence to the fallacy at the time so prevalent. He did not believe in the influence, which, it had been asserted, would come from the Board of Agriculture. He believed it would be as insufficient as the grand Geological Survey, from which so much was promised.

Mr. Taylor, of Loudoun, said, he had not intended to trouble the House with any remarks of his in opposition to the bill now under consideration; but many members near him expressed surprise that *he*, coming from a county distinguished for its success in agricultural pursuits, should be found in opposition to this bill. He felt it his duty to that great interest to oppose the bill now under consideration. He had been raised a farmer—a *practical* farmer, not a *book* farmer. In his opinion, it required no science and no reports from a Board of Agriculture to teach men how to handle the plough, the axe and maul. The best farmers in the world, Mr. T. said, were the plain people of Pennsylvania, who were in the constant habit of doing their own work.

Mr. Kincheloe took ground against the bill. He said the proceedings now had, in relation to the present bill, reminded him of the fact that there once existed a Board of Agriculture in the state. When that Board was established, there was no doubt the same display of eloquence in its behalf as now, and the same promises of large benefits that would result from its operation. That Board and its history might be cited as a case in point why the House should not sanction the continuance of the present. It was created with ten members, who received pay and mileage. It was continued for some years, until it was perceived that it did not answer the purposes for which it was intended, when it was abolished. Thus, the people lost about $50,000 in the experiment, before their eyes were opened. He (Mr. K.) was opposed to the bill, because he considered it would be of no practical utility or importance; yet, whilst he did oppose the measure, he declared himself to be a friend of agriculture, as the foundation and moving cause of every thing else.

Mr. Clendenin protested against the passage of the bill. It would cost 5 or $600 now, and yearly additions would be made to the expenses of the board. He therefore moved the indefinite postponement of the bill, and called for the ayes and noes on the motion.

Mr. Rives regarded the provisions of the bill, not in the light of a loan granted to agriculture, but as a *right* which that great and controlling interest might demand. Considerations of a wholly different nature from those which influenced the conduct of many gentlemen, should determine his course. He denied the dignity and consistency of the course proposed to be adopted in relation to this measure. Last winter the bill was, after a discussion, passed. Gentlemen had said, that it passed upon an understanding, that the members of the board were to receive no compensation. Had they looked to the evidence before they made the assertion? The gentleman from Spottsylvania, said it passed only on that condition. As to compensation, Mr. R. thought it was merely a matter which had been omitted in the bill establishing the board. The members had met and deliberated. Gentlemen declared they had done nothing. True—but, asked Mr. R., had they not taken incipient steps for obtaining a consummation which would redound to the honor and interest of the whole commonwealth?

Mr. R. then spoke of the impropriety and inconsistency of the course proposed to be adopted, by the ryder of the gentleman from Rappahannock. It was proposed to tell the members "you have done nothing—you have been of no service—still, we will pay and discharge you." Was it wise, dignified, or prudent to say this to those gentlemen; to destroy the board, and yet pay them a few dollars and cents? As honorable and high-minded men, would they receive the compensation tendered under such circumstances? Mr. R. asked gentlemen to pause before they abolished this board, and before they came to the conclusion that it could do no good.

Mr. McIlhaney said, he was unused to public speaking, but was sincerely devoted to the agricultural interest of the state. No man in the house excelled him in the zeal which he felt, and was ever ready to manifest, by his practice, for the *bone and sinew* of his country. He was emphatically a farmer in all his notions and feelings. He had been partly brought up to the plough. With all the care and attention of which he was capable, he had listened to the arguments and views of those who had advocated this measure. He had seen gentlemen of the bar, rise and theorise on farming with all their strength. Now, he could say, as to those gentlemen, that, if they expected their sons to be benefited by the theories of a board of agriculture, they were very much mistaken.

But, said Mr. M., the House has been told by the gentleman from Jefferson (Mr. Kennedy,) a man who was very near to his heart, that much good had resulted to the cause of agriculture by boards established in other states. He referred to Pennsylvania. He would accompany the gentleman in his investigations in that quarter, for he had visited that state and spent some time there;

it was to improve his knowledge and enlarge his views by inspecting the system of cultivation pursued by the farmers in that country. In that great and fertile valley extending from Philadelphia to Lancaster and Columbia, and thence to Little York, whom did he find to be the best and most successful farmers? who possessed the most highly improved lands, and most remarkable for economy? Those who have been brought up to the plough handle; those who trod their own soil, the honest, plain-spoken, hard working Germans, who never saw the printed report of an agricultural board. They taught me more in a day or two, than a board of agriculture could in a year. The German farmer affords an instructive example to any one who would seek to know how to carry on a well-cultivated farm—and this truth is strongly illustrated in the county which he had the honor in part to represent. Mr. M. said his people were economical in their principles and habits, and had clearly intimated to him to study economy in his votes. So long as he retained his senses, and knew what he was doing, he meant to do his duty, and carry out their wishes. If the scheme before the House was a good one, he would vote for it; but he did not so think. It might only cost $500 now, but hereafter, it would cost thousands without an equivalent. This small sum was the beginning—improvements of the scheme would be thought of, and more money demanded to carry it out. He should, therefore, vote against the bill, and hoped, if the learned lawyers who advocated it, wished their sons to acquire agricultural knowledge, they would encourage papers, friendly to the diffusion of information upon this subject, and bring them up to a practical knowledge of the plough and the scythe.

The question was then taken on the engrossment of the ryder, and decided in the negative.

Mr. Scott of Fauquier then addressed the House briefly, in support of the bill—after which it was passed—ayes 90, noes 34.

[The bill, as passed, was before published at page 138 of this volume of the Farmers' Register.—Ed. F. R.]

REMARKS ON THE LEGISLATIVE DEBATE ON THE BOARD OF AGRICULTURE.

We have reluctantly given the space it occupies to the debate on the bill for paying the Board of Agriculture. *Reluctantly*, we say, because, though the debate forms a large part of all the legislation of Virginia for the benefit of agriculture, and therefore has a right to a place in the Farmers' Register, we are really *ashamed* for Virginia, that the decision should turn on such facts and such arguments as are there displayed. We are not objecting to the course of any member of the legislature for opposing the establishment of a Board of Agriculture, nor for his voting against the last bill, because of such general opposition. Our most intimate associations were with some members who have been throughout thus opposed to the establishment, and to all legislation thereon; and in all our intercourse, we never uttered to one of them a word, in the hope of removing their objections, and still less would we have thought of blaming their decision. We can very well appreciate the objections of such opponents, when even *we* almost despair of any important service being rendered by the Board, discountenanced as it has been from the beginning, and treated with suspicion and contempt by the legislature; and without promise, or any yet visible appearance, of designed support and aiding labors from the agricultural class. It requires but little stretch of wisdom to infer, and to predict, that if left to rely upon their own exertions only, without aid and without sympathy from their fellow agriculturists, all the zeal and labors of mind and body of the members of the board will result in nothing, compared to its great objects, and to what might be the results of such an institution properly aided and sustained.

We object not, therefore, to the mere opposition of legislators to the bill, but to the manner of their opposition, and the ignorant flippancy exhibited in the debate. Mr. Strother condemns and ridicules the members, because in their first and only session they had communicated no important agricultural information: and he speaks contemptuously of them, because they so soon "wanted their pay." Now we should be glad to be informed *what* information could possibly have been expected from a board just met and organized, and which merely remained in session long enough to digest a plan for future operations, if enabled to act at all, by the aid of the legislature and the farmers of the country? If, instead of this course, the members of the Board had proceeded to put forth a report of their individual agricultural opinions, and had remained long enough in session to digest, write out, and submit the elaborate report to the legislature, would not Mr. Strother have been among the first and loudest to prefer against them the well-founded charges of foolish presumption, and of making a useless demand on the treasury, by such length of session? As to "their pay," it is very true that this subject occupied part of their report, and with good reason. Every man must know that there never could have been a second meeting of the Board, if the members were *again* expected to come, at their own expense, from the most remote regions of the state. It was therefore the duty of the Board frankly to state the existence of an obstacle which, if remaining, would certainly prevent any useful or continued action of the body; and which, if not removed, would render perfectly futile all efforts to carry into effect any plan of operations which might be prepared. It would have been but a ridiculous farce to digest and to start a general plan of procedure,

which could not by possibility proceed to fulfilment. And the men who submitted to accept the appointments, under such discouraging circumstances, (independent of subjecting themselves to the ridicule and contempt of such as Mr. Strother,) have already made, and are prepared to make sacrifices for the public good, of which Mr. Strother probably has no conception of the possibility.

Mr. Strother further charged, (without the least foundation of fact,) that the Board "informed us that they had turned their attention to the geology of the state;" and in a subsequent speech he charges as given to the encouragement of agriculture, all the large sum that has been thrown away on the geological survey of the state. He cannot think much worse of the manner of that expenditure and its results than we do; but it is utterly unfounded to charge it to agriculture. It has been emphatically *a job*—such as legislative bodies are easily persuaded by plausible and self-interested lobby members to allow for private benefit, under pretences of subserving the public good—and which, (the geological survey,) has been of not the slightest benefit to agriculture, and very little to any other *public* interest. Mr. Strother is welcome to refuse even to give the present estimated expenditure of $500 a-year to aid agricultural improvement; but we protest against his claiming that some $40,000 have been already applied to that object, because so much has been spent in the costly humbug termed a geological survey. If given to that bottomless pit, the James River canal, it would have been more profitably expended.

Mr. Crutchfield informs us that a Board of Agriculture formerly existed in this state, with John Taylor of Caroline at its head, and which, proving worthless, was suffered to go down. And Mr. Kincheloe adds to this newly discovered piece of history of agriculture in Virginia, that in the few years it continued in worthless (and since forgotten) existence, this Board cost, in pay and mileage of its members, some $50,000 to the people "before their eyes were opened." No correction or reply was offered to these statements, by any member, and therefore we presume that they were admitted as true. It is, however, the first intimation that we have had of such occurrences; and however hazardous it may be to assert a negative, and to deny the existence of legislative acts affirmed by legislators in debate, we will presume to express our confident belief that there is not one word of truth in the whole statement—that there never has been before a Board of Agriculture established by the state--and of course that John Taylor was not at its head—and that no such cost as $50,000, nor any other cost, was caused by any such establishment. Though not much conversant with laws or legislative proceedings, and therefore we may well be ignorant of many such matters, we remember some facts which we presume served for the entire material of which this old and forgotten "Board of Agriculture" was manufactured. There was once in existence an Agricultural Society of Virginia, over which John Taylor presided—which society asked and *was refused* legislative aid and bounty, for the improvement of agriculture. These facts, we infer, are the true original "something as black as a crow," which became "the three black crows," thrown up by Mr. Crutchfield and Mr. Kincheloe before the House of Delegates.

The results of all the labors and efforts of the Board of Agriculture may indeed prove to be as worthless, and their procedure as profitless to agriculture, and even as contemptible, as Mr. Strother has endeavored to make out. But whether so or otherwise, the Board, or its working members, will not the less have labored much more than is to be recompensed by "their pay." The full payment for the session of six working days, and travelling expenses, of the member who writes these comments, amounted (as understood from the law, for it has not been drawn,) to $22. And he is very confident that he has performed more labor than did most of the members of the legislature in six weeks of *their* session—and that his labors were as little directed by the consideration of the *per diem* allowance as those of any member of the legislature, whether voting for or against the repeal of the 90 days' limitation or "starvation law," of the late session.—**Ed. F. R.**

SHAD FISHERIES.

From the Philadelphia Ledger.

In your paper of the 31st March, you remark that "a large number of fishermen left the city yesterday for fishing, with shore nets. Shad may be expected in abundance, and the price greatly reduced. They are not allowed to fish for them (shad) but with gill nets, till the 1st of April."

In this latter clause you are in error. The laws for regulating the shad fisheries do not specify the time to begin operations with either description of seines, but do fix the period at which they shall cease, viz., on the 5th day of June.

The gill seines are, at this early stage of the season, fishing below where the Delaware and Pennsylvania line strikes the shore, and are of course out of the concurrent jurisdiction of Pennsylvania and New Jersey, and not amenable to the laws regulating their respective fisheries.

It is by thus assembling in the lower part of our river, to the number of several hundred nets, varying in length from fifty to near three hundred fathoms each, stretched directly across, and drifting with the current, breaking up and dispersing the shoals of shad, and confining them to the salt or brackish water, where they are compelled to

deposite their eggs, which are of course lost, instead of being allowed to reach the fresh waters whither their instinct directs them, that the great scarcity of shad, of late years, is wholly attributable. In the Connecticut and Delaware rivers, in the ratio of the increase of gill nets, the shad have decreased. On the Potomac river, on the other hand, where the gill nets are not allowed, but where the shore seines, in some instances, are nearly a thousand fathoms long, and where they commence fishing as early as they please, and fish as long as it is profitable, (Sundays *not* excepted,) the shad are as abundant as ever. Indeed they were never caught in greater numbers there than last spring. Such too was the case in the Delaware, until the gill nets were so greatly multiplied. Before this description of net was introduced here, the shore seines, then more numerous than now, supplied our city and the country adjacent to the river with abundance of shad, at an average price of from six to eight dollars the hundred—of late it has attained to twenty dollars the hundred.

That the gill seines do cause the shad to leave our river, may be proved by the fact, (related to me by a respectable and intelligent old fisherman from Egg Harbor,) that a few years ago the shad entered our bay in great numbers; the gill nets met them early and far down, and took them in great quantities—when suddenly they became scarce, but in a very short time after made their appearance in the inlets along the Jersey coast. His conviction was, at that time, that, meeting with such obstructions, they abandoned the Delaware for other waters. This conclusion is borne out by a fact related to me only a few days since, by a gentleman once largely interested in the shad fishery, that in the early part of last spring, the shad ascended this river in considerable numbers, to where the gill seines obstructed the channel, and were taken in great numbers by them; that they soon, however, commenced a retrograde movement, the gill seines keeping pace with them. The inference is clear that they *too* left our river, inasmuch as but comparatively few reached the shore fisheries immediately above. Indeed, some of the latter, hitherto valuable, did not defray expenses.

So far is it from being probable that the price of shad will be "greatly reduced," the experience of every succeeding season, of late years, shows that it has risen with the decrease of the shad. Indeed, the predictions made by experienced fishermen, when the gill nets were first introduced, that shad, in consequence of them, would soon become as scarce in the Delaware as salmon were in the Connecticut river, seem likely to be verified.

S.

CAUSE OF PHYSICAL DEGENERACY.

From the Maine Farmer.

The question was asked in the Farmer a long time since, "What are the causes of the deterioration of the human race for the last fifty years in America?" I have never seen it answered to my entire satisfaction. Undoubtedly a number of things have or might have had a bearing on the subject, but if animal life consists in the effect of stimuli operating on what may be stimulated, then it seems that an exact proportion of stimuli to excitement, excitability, or what may be stimulated, would be perfect health, (if such a thing ever was.) I know that too much stimulating food and drink, if the above principles are sound, would produce just what we see has taken place. Our diet has been too much animal food, and particularly that which is oily. Destroy digestion in any animal and you belittle him. The use of tea and coffee in the room of milk, and the several kinds of mixtures that used to be made from milk, is another cause. Provoking the appetite by the modern art of cooking with too great a variety, to eat too much, is another cause. As I have before said, destroy digestion, and you belittle any race. Hard grain given to young colts has done it, and produced lasting disease through life. Very high keep in pigs, and a confined life, will and has done it in that race. Rum will destroy the growth of a puppy—and the deleterious effects of ardent spirits upon the human system are, alas! too plainly apparent. I will also mention a lack of exercise in the open air, among the causes of degeneracy. This is best obtained by *actual labor*.

In order to renew our race, let us return to the diet, exercise and habits of our forefathers of the revolution.

I do not pretend that I have done the subject justice. I merely submit the above as a few, what I call, common sense thoughts.

NOT A PHYSICIAN, BUT AN
OLD-FASHIONED FARMER.

URINE.

(From Squarey's Treatise on Agricultural Chemistry.)

"When it is considered," says Liebig, "that with every pint of urine, a pound of wheat might be produced; the indifference with which this liquid excrement has been regarded is quite incomprehensible."

We can here only join in expressing our surprise at such neglect; but we would at the same time fain hope that such neglect has arisen entirely from ignorance of its value, and in the zealous endeavors that are now making by agriculturists at large, and the zeal, energy, and ability that is now displayed, we may fairly anticipate a juster appreciation of this manure for the future.

That we do not overrate the value of this manure, may be proved from the following results of the analysis of 100 parts of wheat manured in different ways, and which places human urine in the very first place as to value.

We have before stated that the weight and value of wheat as an article of food, depends on the quantity of gluten it contains, and this fact admitted, no other argument is required to convince us of the superiority of urine as a manure:*

100 parts of wheat manured with

	Gluten.	Starch.
Human urine (dried) yielded -	35.1	39.1
Bullock's blood (dried) - -	34.2	41.3
Human fæces (dried) - -	33.1	41.4
Sheep's dung - - -	22.9	42.8
Pigeon's dung - - -	12.2	63.2
Cow's dung - - - -	12.0	63.3
Vegetable Humus - - -	9.6	55.9
The same soil not manured -	9.2	66.7

* Analysis of Hermbstoedt, quoted by Professor Dauberry.

We have elsewhere endeavored to show, that all excrement partakes of the nature of the food; that if food, consisting almost wholly of nitrogen, is consumed, that such excrement will principally consist of the nitrogen not required to supply the waste of the body. That if food principally consists of substances in which carbon predominates, that the matter voided as excrement neither is nor can be so rich in nitrogen as in the preceding case: the rule holds good throughout all creation; and therefore, as man is a carnivorous animal, and lives in great measure on the flesh of animals, a substance almost entirely composed of nitrogen, human urine is much richer in this substance, nitrogen, than in animals living exclusively on vegetables. The analysis of these matters accordingly proves that human urine contains four times more fertilizing matter than the urine of horses, cows, and sheep.

In all the remarks then that follow, we must be considered as speaking of human urine; but the same arguments will apply to the urine of all animals, only in lesser proportion.

And it must be again repeated that the liquid excrement of all animals is infinitely to be preferred as a fertilizer to the solid excrement, the urine in all cases containing all the soluble salts which are thrown off from the body as waste matter; such as the ammoniacal salts, the phosphates or soda, potash, and magnesia, the substances which are now recognized as constituting the ingredients of all kinds of grain, and which are essential both to their growth and developement, and for supplying the nutritive matter of the grain.

Berzelius gives, as the contents of one thousand parts of human urine in his elaborate analysis of the fluids,

	Parts.
Urea - - - - - -	30
Lactate of ammonia and animal matter	17¼
Uric acid - - - - -	1
Sulphate of potash - - - -	3¾
Sulphate of soda - - - -	3¼
Phosphate of soda - - - -	3
Phosphate of ammonia - - -	1½
Chloride of sodium - - - -	4½
Muriate of ammonia - - -	1½
Phosphate of magnesia and lime -	1
Water, mucus, and silex - - -	933

"If from the above analysis, we take the urea, lactate of ammonia, uric acid, the phosphate and muriate of ammonia, one per cent. of solid matter remains, consisting of ammoniacal salts, which must possess the same action, whether they are brought on a field dissolved in water or urine," Hence the powerful influence of urine must consist in its ammoniacal salts. Now, when urine is allowed spontaneously to putrefy, one portion of the ammonia unites with the lactic acid to form lactate of ammonia, and another becomes volatile in the state of carbonate of ammonia.

The formation of this carbonate of ammonia entirely alters the state of the urine, rendering it an alkali, instead of an acid, which it is in its natural state; and this explains why putrefied urine is to be preferred as a manure to urine in its fresh state. Now the great object is to fix this carbonate of ammonia, or at all events the ammonia, in the soil.

If the urine is applied as a manure in this state, that is, with the lactate and carbonate of ammonia in solution; the latter salt, from being volatile, will evaporate with the watery parts of the fluid; and the loss which would accrue from this mode of using it, would amount to nearly one-half of the weight of the urine employed. So that, if by any means we can fix the ammonia, that is, deprive it of its power to fly off with the evaporation of the watery parts of the urine, we shall increase its action twofold. This object may be effected in a variety of ways. If a field is strewed with fresh burnt gypsum (sulphate of lime) and then the putrefied urine be applied on its surface, the gypsum will absorb and decompose the carbonate of ammonia, and the carbonic acid gas thus disengaged, will unite with the lime to form carbonate of lime, and the sulphuric acid of the lime will unite with the ammonia to form sulphate of ammonia and this salt will remain in the soil and not be volatilized.

But a simpler way still is to mix the gypsum with the putrefied urine, and thus effect the double decomposition above described before distributing it on the soil.

The quantity necessary will of course depend on the quantity of carbonate of ammonia the urine may contain, and this not only varies with every stage of putrefaction, but depends also on the way in which it has been kept; and again on the quality of the urine itself, no very definite quantity therefore can be named. But an easy way of knowing how much gypsum to put to a certain quantity of urine is to add it constantly at intervals of a few hours (taking care to stir the mixture well occasionally) as long as any volatile smell, similar to hartshorn, escapes, the absence of which will be a sure test that the ammonia has lost its volatile property, and has become, to use a chemical and expressive term, fixed.

Chloride of lime may be used for the like purpose, but being more expensive than the gypsum, it would not of course be resorted to.

Dried peat, tanners' bark, sawdust, turf and other similar substances, may be also used for this purpose, but the gypsum is decidedly preferable.

Sulphuric acid, the oil of vitriol of commerce, may also be advantageously used to fix this salt, and to do so, nothing more is necessary than to mix a sufficient quantity of this acid with the putrefied urine, until almost all effervescence ceases, keeping it well stirred during the whole of the time, and taking care not to add an excess of acid. In this case the ammonia unites at once with the sulphuric acid, to form the sulphate of ammonia; and the carbon being disengaged, escapes in the state of a gas.

Other means might be used to effect the same results as we have here demonstrated; but it is needless to specify them, as those we have already detailed combine great facility as well as extreme cheapness.

Having thus specified the change that takes place in the state of urine, the best manner for converting the ammonia for the purpose of agriculture, we shall suggest the best means of practically using this manure on a farm.

The first thing necessary is to procure a supply of urine. But if due care is used to save all that is now wasted, no farm need be in want of it.

The supply being obtained, it should be placed in large casks or tanks under cover, until the vo-

latile smell of the ammonia indicates that decomposition has taken place. When this occurs, it may be either poured over a heap of compost, consisting of coal ashes, charcoal or gypsum, in any proportions that are the most conveniently obtained, and then allowed to dry by frequently turning the heap. Care being taken, that if any volatile smell occurs, during this process of drying, that more gypsum be at once added. The volatile ammonia will in this operation be absorbed by the gypsum, and converted into a sulphate of ammonia, and other parts will be absorbed in the gaseous state by the charcoal and the ashes; but all will at once be yielded up to the first moisture that may come in contact with the heap; and therefore, it may be very properly classed amongst those fertilizers which act as a stimulus to the plant. We would, therefore, reasoning from analogy, suggest the use of this dried compost, as an excellent substitute for bones in the drill in sowing turnips. And we are further confirmed in this opinion, from the fact, that the new manure, the urate, only lately introduced, and which is presumed to be prepared somewhat in this way, has been found to answer admirably for the purpose intended. The addition, however, of a phosphate of lime, would increase its value in this respect, and render it undoubtedly more valuable than bones for this purpose.

Another compost heap, which would answer admirably for any purpose almost for which a manure can be required, that is, either as a stimulant for turnips, as a pabulum for wheat, or white crops —or, again, as a top-dressing for either of the above, or for grass—may be readily formed by mixing long stable litter, in which decay has already commenced, with the burnt ashes of vegetables or wood, in somewhat indefinite portions; taking care, however, that the litter should predominate, and then pouring over the heap daily a portion of the putrid urine, and stirring the mass well up together.

In this heap the ammonia of the urine would be decomposed; but the nitrogen, the vivifying principle of the ammonia, would unite with the alkaline matter, the soda or potash of the burnt vegetable ashes, to form nitrate of potash or soda: the hydrogen, the other constituent of ammonia, being given off.

After what has already been said about the utility of these salts as fertilizers, it will be needless to add more here, than earnestly to recommend every agriculturist to adopt these simple means for the production of two manures, which in value to the farmer cannot be surpassed—both for the facility and economy with which they may be prepared, and which would by their fertilizing properties confer a benefit not only on the farmer, but on the community at large.

It may be urged as an objection, that in many localities, far distant from towns and cities, this manure could not be obtained in sufficient quantities to supply the place of other substances more readily obtained. To this objection we would beg to suggest, that if ever a demand for this article exists, means will be taken to secure a supply; and, that in such a case as above supposed, the farmer's wagon would be enabled to load back from the town or market where their produce must eventually be consumed, with this matter. And further, they may commence with the supply that is always to be had to some extent on their own farms, and thus verify the results here predicted.

We will only add, that the urine of one man, taken at its lowest calculation, will produce in one year, a sufficient supply of nitrogen for the formation of 800 pounds of wheat, or 900 pounds of barley; a fact of sufficient importance, it is hoped, to induce a trial at least—and this trial fairly made, we have no doubt of the result.

Indeed, if all the human excrement, now worse than wasted, were applied to the purposes of agriculture, animal manure might be entirely dispensed with. But if we look at the subject on an extended scale, and see the thousands of acres now barely cultivated at all, but all of which only require manure to be applied to them, to enable them to yield abundant crops; and if we reflect on the benefits all must derive from such an increase to the real wealth of the country, as the cultivation of these lands would induce; and further, that the increased means thus afforded, would as certainly induce an increased population, which again in their turn, acting fully up to this system, would again prove another source of wealth and strength to the community—we may be enabled to estimate in some slight measure, the order and arrangement that exists in nature, for the support of all her creatures; and that it is the neglect of those means, which providence in its wisdom has placed at the service of man, and not any imperfection in the grand scheme of the creation, which has induced the impious belief by some, that a redundant population may be a curse instead of a blessing.

But to return more immediately to our subject. Enough has been said to show that ample means exist for bringing all the waste lands gradually into cultivation; that we have the power, if we have the inclination, to do so. And the circumstances of an increase, and rapidly increasing population, may compel a much more attentive consideration, than this subject has hitherto received, and one which eventually must lead to the benefit of all classes concerned.

So much for human urine. The urine of animals, as previously stated, from the nature of their food, contains much less nitrogen than that of man; but is equally, and in many cases, much more rich in the saline properties it contains, such as the phosphates of magnesia, and the salts of potash and soda. They are, therefore, by no means to be neglected, and indeed all the remarks appended to the subject of human urine apply here only with lesser force. We would, however, recommend, that all stables, farm-yards, sheds and other places where cattle are kept, should be so arranged, as for the urine to be saved, and applied in the manner we have before described.

Connected with this subject it may here be stated, that the strong volatile smell, which is almost overpowering, when entering a close confined stable, where many horses have been shut up for the night, arises entirely from the volatilizing of ammonia in the urine.

A very simple, and at the same time a very profitable way, of correcting this injurious atmosphere, is to strew the stable with gypsum, which would absorb the ammonia at once as it is formed, and prevent the presence of this gas in the atmosphere. Such an arrangement, besides being pro-

fitable, as one source of accumulating ammonia, would also act beneficially on the horses so confined, as there can be no doubt, that breathing such an atmosphere constantly for some hours together, induces a highly excited temperament, which leads to, or at all events very much increases, any local inflammatory action, and renders the cure of such a malady both difficult and uncertain.

These remarks, however, do not go to the length of suggesting the use of gypsum as a cure for such a stable, it is only a means of absorbing the obnoxious principle and turning it to account; but ventilation, to a considerable extent, is the only cure and the best.

Of the relative value of human urine, when compared with other animal matters, it is calculated by Macaire, that 100 parts of human urine are equal, in their fertilizing power, to 1300 parts of the fresh dung of the horse, or 600 of those of the cow. Nothing more therefore can be said in favor of this manure; it must now be left to those who have the means of applying and testing its real value.

In speaking of nitrogen we have fully explained how ammonia acts as the pabulum of plants, but we will here again shortly repeat it.

Ammonia is composed of nitrogen and hydrogen. Now, when the ammonia, in a state of solution, is absorbed by the spongelets of the roots, decomposition takes place, the nitrogen is assimilated to form the gluten of the seed, and the hydrogen either unites with carbon, to form the essential or fixed oil of the plant, or is evaporated through the leaves as useless matter.

That such is the effect of ammonia or nitrogen, applied under any circumstances, in which the salt is soluble, can be easily demonstrated, by applying it to any crop, when it will speedily assume a dark green color and luxuriant appearance, which is the peculiar effect of the nitrogen alone, and which is forcibly illustrated in the dark green circles, popularly called fairy rings, which exist on the downs, and which owe their dark color entirely to the mushroom or fungus spawn, existing under the surface, and which spawn consists almost wholly of nitrogen, and communicates its property to the grass growing above.

The specific action of nitrogen also, by endowing the plant with greater energy, enables it to assimilate more carbon from the atmosphere, and thus the addition of this manure, which is in every respect an essential to plants, gives it a greater power of assimilating another substance of almost equal importance as itself.

In concluding our notice of this manure we can only repeat that the liquid and solid excrement of man used together, and prepared in the way we have described, forms from its combination of ammonial salts, with the phosphates of magnesia and soda, the most valuable compound that can be devised, and its extensive use will confer a double benefit to the farmer and to the public, as well by the removal of matter, which is now only considered as a nuisanse, as by increasing the produce of the soil.

PRUNING FRUIT TREES.

From the Maine Cultivator.

Those who have fruit trees that require trimming, would do well to attend to it now. It has been clearly ascertained, I think, that the practice of pruning apple, pear, and other fruit trees at this season of the year, is much more judicious than that of pruning in the fall or winter. Perhaps there may be some whose experience would seem to point to the opposite course; and it may even be, that in certain instances, the results have been far less favorable than was anticipated.

But as a general thing, I think there can be no doubt, that wounds, caused by the excision of limbs, heal much more rapidly, and are far less detrimental to the health of the tree than those inflicted at any other time.

The *rationale* of this theory will be obvious to every one who reflects upon the subject, and need not here be explained at length. Those who have fruit trees infected with the wart, or black excrescences which have of late proved so fatal to our best fruit trees, in many sections of New England, especially the cherry and damson, would do well to look to them. There is now no ground to doubt the origin of this disease. It is caused, indubitably, by the minute perforations occasioned by vernal operations of a certain fly which seeks the soft and yielding bark as a *nidus* for their future young.

The *larvæ* of this insect being deposited in the cuticle, lies there irritating the delicate vessels, and thus occasions the exudation of the sap which originates the disease. I remember having seen an able article some years since in the Yankee Farmer upon this subject, from the Hon. Rufus M'Intire of Parsonsfield, in which it was recommended, that all limbs infected with this disease be immediately cut out. The writer represented that he had thus entirely overcome it, and that no doubt need be entertained as to its efficiency, or fears for the tree.

There are few subjects connected with the farming art on which more has been said and written, than upon this. And yet there are thousands whose trees are now suffering, and who are endeavoring to regain their regeneration by the application of remedies; the legitimate effects of which are decidedly adverse to the securement of their aim. W.

Windham, April, 1842.

The opinion of our correspondent, that this is the season of the year for general pruning, although of ancient date, is nevertheless a good deal questioned hereabouts.

Except in grafting or heading down, which ought to be done "about now," good orchardists are getting in the way, and we think judiciously, of pruning in the longest days in the year, say in June, or July.

Wounds in trees, caused either by the excision of limbs, or in the bark, heal up more readily in June or July, according to our observation, than they do, if inflicted during the flow of the sap: and the sooner this is effected after the excision, the better it must be for the tree. He who has a proper regard for the thrifty growth and life of trees, will avoid doing any thing to prevent the annual formation of the viscid substance which covers the tree beneath the bark, as this layer

is indispensable to their vigor and health. This substance is formed in the spring or early summer, by the free and regular circulation of the sap, and to trim trees before this layer is formed is thought to be very deleterious to their growth.—*Ed. Maine Cultivator.*

LIME.

From Sinclair's Husbandry.

There is perhaps no country in Europe, where calcined lime is used to so great an extent, and in such quantities, as in the more improved and improving districts of Scotland. This may be partly owing to the total absence of chalk, which abounds in so many parts of England, and which renders calcined lime less necessary there; but it is principally to be attributed to the great benefit that has been derived from its use. In bringing in new or maiden soils, the use of lime is found to be so essential, that little good could be done without it. Its first application, in particular, gives a degree of permanent fertility to the soil, which can be imparted by no other manure. Its effects, indeed, are hardly to be credited, but their correctness cannot be disputed. Maiden soils, in Lammermuir, of a tolerable quality, will, with the force of sheeps' dung, or other animal manures, produce a middling crop of oats, or rye; but the richest animal dung does not enable them to bring any other grain to maturity. Peas, barley, or wheat, will set out with every appearance of success; but when the peas are in bloom, and the other grains are putting forth the ear, they proceed no farther, and dwindle away in fruitless abortion*. The same soils, after getting a sufficient quantity of lime, will produce every species of grain, and in good seasons bring them to maturity, in all future times, always supposing the ground to be under proper culture, and the climate adapted to the crop. This fact proves, that oats and rye require less calcareous matter than what is necessary for other grains; that lime acts as an alterative, as well as an active medicine, and that the defects in the constitution of the soil are cured, even after the stimulant and fertilizing effects of the lime have long ceased to operate. Lime is also peculiarly beneficial in improving muirish soils, by making them produce good herbage, where nothing but heath and other unpalatable grasses grew formerly. The expense of this article in Aberdeenshire is stated to be enormous, very little of it being produced in that country; yet lime is there considered to be absolutely necessary, and, indeed, the foundation of all substantial improvements.† It is supposed, however, not to be so useful on the sea-shore, as in the more inland districts, from the soil being perhaps mixed with sea-shells.

The importance of lime as a manure is strikingly exemplified by the following information from Mr. Walker of Mellendean: He entered into the possession of that farm twenty-five years ago, and then gave the whole farm, (with the exception of a few acres of the *richest soil* in different fields, which had for ages been manured as infield,) a good dose of lime. From the newly-limed land, his returns were fully equal to his expectations, and greatly superior to those from the richest spots that had received no lime. Being very desirous to ascertain how long the limed land would maintain its superiority, he kept both the limed and unlimed under the same management in every respect, during his first lease of twenty-one years; and he can affirm, that at the end of that period, his crops upon the limed land were equally good, and as much superior to those of the unlimed land, as they were at the commencement thereof. Having got a new lease of that farm, he proposes laying lime upon every spot of ground that was not limed formerly, being convinced that he has been a considerable loser by his experiment. How long therefore the effects of lime may last, he will not take upon himself to foresee; but he can safely say, that there is land upon his brother's property at Wooden, that was limed by his farther upwards of thirty years ago, where the effects of the lime, upon every crop, are still as apparent as when it was first laid on the land.

It is proposed, in discussing this subject, very shortly to explain the following particulars: 1. The soils to which lime is applicable; 2. The distance from which it has been carried; 3. The quantity used; 4. The best mode of slacking; 5. The common modes of application; 6. The plan of top-dressing the surface; 7. The price; 8. The use of pounded limestone; and, 9. The causes which may occasion its failure.

1. This manure is certainly well calculated for clay lands. Some recommend laying on a certain quantity of it, to the amount of 20 bolls of shells, or 120 bushels, to the Scotch, or 96 to the English acre, and as hot as possible, every time the land is fallowed. This plan, however, is objected to from respectable authority; and it is contended, that so small a quantity of lime shells is quite unfit for stimulating any kind of soil, except where it is of a dry muirish nature, and not formerly limed. To lime land every time it is in fallow, seems unnecessary, more especially if a sufficient quantity were applied in the first instance.* From 60 to 70 barley bolls *per* Scotch acre, or from 390 to 420 bushels *per* Scotch, that is, from 288 to 356 bushels *per* English acre, are quantities frequently given in East Lothian. In regard to loams, if they are in good condition, and in good heart, perhaps liming once in the course of two rotations will be sufficient.† It is a rule, however, in regard to the application of lime, and other calcare-

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* Marl, although containing calcareous matter, is not so effective. It will produce oats, barley, and early peas in abundance, and in some situations will also produce wheat, when the season is favorable; but wheat crops cannot be depended upon from marl alone.

† Communication from Mr. Barclay, Mill of Knockleith. It is observed, that lime has sometimes been withheld both from low lands after fallow, and from hilly lands after turnips; but in all these cases, with an evident loss to the occupant, by a decrease of produce throughout the whole course.

* Mr. John Shirreff remarks, that to specify a quantity for all lands is impossible, so much depends upon the depth and quality of the soil; also on the quantity of calcareous matter, either previously applied, or originally in the soil.

† Communication from George Paterson, Esq. of Castle-Huntly.

ous manures, that they should only be applied to land in a dry state, and well drained.

2. It is astonishing the distance from which lime is carried in some parts of Scotland. Mr. Blackie of Holydean, in Roxburghshire, drives it twenty-two miles, and the carriage, when hired is 7*s.* 6*d.* *per* boll of shells. In the parish of Moffat, where of late considerable improvements have been carried on, and corn, turnips, and clover, raised in great perfection, 1000 feet above the level of the sea, the lime is carried from Douglas, at twenty-seven and thirty miles distance. It is sometimes carried on the borders, but in no great quantity, about thirty, or even thirty-two miles;* and in Aberdeenshire, it is driven that distance inland, after being imported from Sunderland.

3. The quantity used varies much. It is evident that strong deep soils require a greater quantity than those which are light and shallow. Baron Hepburn is of opinion, that it should be applied frequently, and in small quantities at a time, especially on gravelly-bottomed loams, which are apt to become too open and pliable by an over dose of lime; by following this practice, he finds his crops wonderfully improved, both in regard to quantity and quality. Mr. Robertson of Ladykirk states, that he has never seen lime used in too great a quantity, if the land is judiciously cropped; if otherwise, it will ultimately hurt the soil. He has laid on no less a quantity than 100 bolls of shells, 4 Winchester bushels each, *per* English acre, and frequently with much success. On dry fresh land a less quantity will do. Mr. Blackie of Holydean considers 16 bolls of shells, on such land, a sufficient dressing. Dr. Coventry is of opinion, that in general, about 6 tons of unslacked or newly-burnt lime, of ninety or ninety-five *per cent.* of purity, may be sufficient for the statute acre of land that has never been limed; but if the lime be impure, a greater proportion will be requisite. Several intelligent farmers are of opinion, that not less than 60 or 70 bolls of lime shells *per* acre, should be laid on a strong clay soil, and that this quantity, with judicious cropping, will be sufficient for a lease of 19 or 21 years.

The information transmitted to me by Mr. Walker of Mellendean upon this subject, is of peculiar importance, as he has limed perhaps more land than any individual in the whole island, and in the course of thirty years has tried various experiments in regard to the quantity that should be applied *per* acre. On newly broken-up land from old turf, he has laid on from 20 and 25 to 40 and 45 bolls of shells, of 4 Winchester bushels each, *per* English acre. On light and thin (outfield) soils, the crop on that part of the field that was limed at the rate of 20 and 25 bolls *per* acre, was as rough, and appeared equally good, with the crop on the land that had received 40 bolls *per* acre; but when it came to be thrashed out, the grain was found very inferior in quantity, and still more so in quality. Upon clay soils, the effects of the lime, where a small quantity was laid, were hardly discernible; while that part of the field that received 40 and 45 bolls produced an abundant crop. Finding the produce of the land that was limed with a small quantity so very inferior, he laid on, (when the land came to be re-fallowed), 20 or 25 bolls more, the effects of which were never perceptible. He is therefore decidedly of opinion, that every kind of soil should have a good dose at once, in which case he considers no repetition to be necessary for a long time after; but if repeated at all, the second liming should be considerably greater than the first, which seems to be the general opinion of the Scotch farmers. As to repeated liming in small quantities Mr. Walker is convinced, that whatever is laid out in that way, after the first dose, is so much money thrown away. He can give no stronger proof, of his conviction in that respect, than his practice upon the farm of Rutherford. He entered to that farm in June 1808, and since that time he has gone over about *eight hundred and fifty acres*; and though a great part of it consists of a light dry soil, and the lime has to be carried twenty-four or twenty-five miles, consequently at a great expense, yet on no part of the farm has he laid less than 40 bolls, of shells, or 240 Winchester bushels *per* English acre, and on many places fully 50 bolls. Nothing, in his opinion, assimilates the produce of outfield, to that of infield land so much, as a good dose of lime laid on at once. The consequence of this liming has been, the most productive crops, of every description, to be seen in all that neighborhood.

Mr. Aitchison of Clements Wells also has found that lime answers every purpose he could wish, in promoting the improvement of his estate in Peebles-shire, where the climate is cold and moist. He began to improve that property in 1806, and in October 1811 he had laid on it, 10,386 bolls, or 62,316 Winchester bushels. His ridges are 18 feet broad; and according to the quantity he wishes to put on *per* acre, his overseer has the following table to conduct the operation.

If it is proposed to lay on 25 bolls *per* acre, betwixt each heap, of one firlot each, there ought to be a distance of - - - -	30½ feet.
If 30 bolls, - - - - -	25¼
35 do. - - - - -	22
40 do. - - - - -	19
45 do. - - - - -	17

And in the same proportion as high as 50 bolls. He never puts on less than 25 bolls, or 150 bushels of shells, *per* Scotch, (130 bushels *per* English acre), and on heavy land he has gone the length of 70 bolls. The day the lime comes to the field, a man follows the carts, and covers it up immediately with earth, by which, generally in a few days, it is reduced to powder. When in that state, it is spread on the land. After trying several other methods, this was found to be the best. The improvement effected by lime on that property has been very great.

4. The slacking of lime completely is a most important operation. The common mode is, to lay it in heaps from the kiln upon the ground intended to be limed; but this, although the most expeditious, is by no means the most advantageous method. In the first place, if the lime is not all of the same quality, (which is seldom the case,) the best lime commonly dissolves first, and the inferior quality continues unslacked; so that it must either be spread in that state, or the good lime must be allowed to receive too much moisture, or again to re-absorb its fixed air, both of which should be prevented. The best mode of slacking, is to lay down the shells in a heap near to water, and by

* Communication from Mr. Walker of Mellendean.

once turning and watering the whole mass, it is reduced to a complete powder; in which state it should be applied to the soil, and ploughed in immediately with a shallow furrow, when there is no doubt but it will mix more intimately with the soil, than by the former method.* This plan, however, is attended with an additional expense of considerable magnitude.

The necessity of slacking calcined lime, as soon after it is burnt as possible, is obvious. If any sudden rain should fall, it would be converted into mortar; no art can then separate it, and mix it equally with the soil; nor would double the quantity have the same good effect. Even after it has been reduced to powder, if any rain should happen to fall, or if by any means it receive too much moisture, while it lies thin spread on the surface of the field, it will partly be formed into hard insoluble cakes, and may remain in that state for years, without mixing with or being of the least benefit to the soil. In the course of repeated ploughings, Mr. Patterson of Castle-Huntly has observed pieces of hard lime come up, as insoluble as if they had been pieces of an old building.

Considering these circumstances, I was much pleased to find, that a mode had been discovered by Mr. Niel Ballingal in Fife, which obviates these difficulties. His plan is, to lay the calcined lime down on any thick head-ridge of good earth, within the field where it is to be applied, and the instant it is so, two men are ready to make up a compost of the lime-shells and earth; three cart-loads of earth to one cart of shells, raised to a ridge long and narrow, five feet high, that rain may not enter it. The moisture in the earth slacks or reduces the lime to a powder; it swells to a considerable bulk, and then all cracks and openings are closed with a spade, and a little more earth put over the whole. In this way, he has had it frequently mixed up for six months, and in one particular instance fifteen months, before it was carted away; and yet when carried on to the land and spread, the whole mass put on the appearance of white lime, flying with the wind, as if newly from the kiln. This mode he means always to follow, being certain of its advantage. It can be mixed as intimately with the soil as if new from the kiln, and he has had crops from it, in this way, superior to an equal quantity of hot lime† both tried without dung. The application commonly is to the summer-fallow: he has also applied it to pasture, quite hot, and in compost as above described, and found both answer well: but the time of application was July, and he soon found, that it ought to lie at least one year or more before the field was ploughed.

Mr. Ballingal having used from 500 to 1000 bolls *per annum*, for several years, his experience may be confidently relied on. He remarks, that lime, if exposed to rain, or even to frost, and slacked like mortar, loses half its effect; no care can then mix it intimately with the soil. His land is wet, and often when the lime is driven unfit for carting upon the field, nor are the ridges prepared for spreading the lime; without having fallen upon such a plan, therefore, he could never have used lime to equal advantage. He adds, that an intelligent neighbor of his, brings his lime from the kiln, lays it in small heaps, about a firlot of shells in each heap, or four heaps *per* boll, on the fallow; covers these instantly with earth, which slacks the lime, and when it is completely so, he spreads it in powder, quite hot, on the fallows, and ploughs it in with a light furrow. This saves labor and expense. He never uses water in slacking lime, and the effects of his practice are very good; the earth, or rather the moisture in it, slacks the lime most completely, and no water is necessary.* This is an excellent practice, and very common in many counties: and many intelligent farmers prefer it to the other plan, which they think would be attended with too much expense to be generally imitated. At the same time, an intimate mixture with the soil is of the utmost importance in the application of lime; any plan that contributes to that object merits attention.

4. Mr. Dudgeon, of Primrose-Hill, considers it to be the most advantageous mode of applying lime, to lay it on in a powdery state, upon ground when under summer-fallow, before the fallow receives the last furrow, and then to mix it intimately with the soil, by harrowing before it is ploughed in. In regard to liming fallows, Mr. Rennie of Phantassie observes, that it is the most profitable mode of application, if it is laid on at a proper season. He has been in the practice, for these ten years past, of laying lime on his fallows, from the 1st of April to the 1st of October, and always found, that the first laid on produced the best crops, which he ascribes to its being more minutely mixed with the soil, by the more numerous ploughings and harrowings, and of course the fermentation more complete, than what is laid on late in the season: June and July, therefore, are to be preferred, so that the lime may be completely mixed with the soil before the crop is sown; and as it is both a valuable and expensive manure, too much attention cannot be given it.

Applying lime to green crops is attended with more difficulty. From observation and practice, Mr. Rennie recommends that, for a crop of turnips, lime should be laid on so early in the spring as to admit of two, if not three ploughings, and as many harrowings, after it is laid on, so as both to mix it properly with the soil, and also to let it have time to cool in the land, otherwise it will be very apt to cause the loss of the turnip crop.

Mr. Park of Windy-Mains is accustomed to lay lime on the land intended for turnips, immedi-

* Communication from Mr. Rennie of Kinblethmont.

† This is an important fact, it being generally supposed that when inserted in the form of hot lime, in a state of perfect powder, its effects are greater and more immediate than in any other way. By Mr. Ballingal's plan, the lime can be carried to the field in autumn, or even in winter, which, though an old practice, could not be done with equal safety, as under the proposed system.

* A correspondent contends that lime is best laid on the land in small heaps, and immediately covered with earth, which in a damp or moist season slacks or falls it; but he frequently puts on water from a water-cart, which slacks it directly, and it is immediately spread in that quick state, harrowed, and ploughed in, when it mixes most intimately with the soil. Lime should be in powder, and the land in a powder-like state, when it is laid on.

ately after harvest, when the land has got the first furrow. He first makes a pair of harrows go backward and forward on each ridge to smooth it, then lays down the shells in huts about 60 or 80 bolls *per* acre Scotch ; as soon as it is powdered, he spreads the huts, and harrows the field, and lets it remain till May, when it may be prepared for receiving the dung.

Mr. Brodie of Garvald, who has long paid peculiar and successful attention to the management of lime, adopts the following plan in applying lime to his turnip land. After the ground intended for turnips has got a winter and a spring furrow, the lime is laid on, and well harrowed in : it then gets another furrow before making up the drills, and is again well harrowed, for the double purpose of getting the lime intimately mixed with the soil, and taking out any quickens, or other weeds, by which the field is infested. The turnips are sown in drills, both as being better for the turnip crop than when sown broadcast, and the lands are got better cleaned, either from annual or perennial weeds. It is reckoned an advantage, to have the lime got forward during the former summer, previous to its being laid on for turnips ; for on a turnip farm, there is so much spring labor, that it is hardly possible to drive any considerable quantity of lime, from any distance, at that season of the year. When it is new from the kiln, it is so hot, that it is apt to dry up the moisture necessary for bringing the turnips into leaf; in this case, the lime ought to be laid on a piece of very dry ground, in large heaps, and thrown up to a considerable thickness, which will make it in a fine state for laying on in the spring, that is, neither in a wet, or in a very hot state.

In regard to green crops, Mr. Paterson of Castle-Huntly thinks it better to lay on the lime after the green crop, rather than before it, so as it may be well mixed with the soil, before it comes in contact with potatoes or other roots, it being apt to burn and blister their skins, and to spoil their appearance, if it does no more mischief. Some farmers, however, have put lime upon the ground after it is planted with potatoes, and harrowed it in. But this practice cannot be recommended.

The application of lime to grass, particularly on light or dry soils, and where the land has been long pastured, is a most advantageous system, if it is soon after to be brought into culture; otherwise, being exposed to the atmosphere, with but little admixture with the soil, it cakes and hardens, and in some measure re-assumes that unproductive quality, which it possessed, previously to its being reduced to a caustic state. It may be applied after the land has been a summer in pasture, or cut for hay ; but the ground should be made as bare as possible, otherwise it will be difficult to spread it equally over the sward or surface. The lime should be laid on in autumn, and the land should remain in grass for another season, till it is absorbed. If intended to be applied to old ley, either lay the lime on one year before cropping, letting it lie upon the surface, or lay it on about Martinmas, and let it lie on the surface till February, then plough it down, and sow the ground when the weather is suitable. Suffering the ground to remain for some years in grass, is certainly the best preparation for lime, as it has then fresh mould, and vegetable matter, to act upon.

Mr. Cuthbertson recommends, that no lime should be laid on high ridges that are intended to be flattened ; the ridge should be brought to the same round in which it is intended to remain, before that operation is accomplished, because, in performing it, there is a great risk of burying the lime. Mr. Barclay remarks, that when the application is made, the land should not be too wet ; and it is necessary, at all times, to have the lime brought to such order, as neither to fly off with the wind, nor go into clods in the spreading.

Mr. Brodie of Garvald observes, that some speculative agriculturists recommend liming upon the surface, to extirpate the heath, and improve the pasturage, without attempting to bring ground under the plough, as the soil and climate may be unfit for the raising of grain. If the lime is at any considerable distance, there is reason to suspect that this would not turn out a profitable concern. At the distance of eight or ten miles, a good liming would not cost less than £10 or £12 the Scotch acre. It cannot be expected that this improvement, on such hills as those of Lammermuir, would even pay the interest of the money. Gentlemen proprietors may improve at this rate, but a tenant would be extremely imprudent, were he to throw away his capital, without a prospect of being repaid. It is surely better to lime land worth the improving, to bring it under the plough, and then to take a few corn crops to refund the expense. The tenant is thus reimbursed, and has an ameliorated pasture, as the reward of his industry and superior management.

Though liming the surface, " to extirpate heath, and improve pasturage," may not be a profitable concern on old swards, it is proper to observe, that when land is broken up, merely for the sake of improving the pasturage, the best, and most economical mode is, to apply lime *to the surface*, and to harrow it along with the grass seeds. A great extent of hilly pasture has thus been improved by Mr. Dawson, and others, in Roxburghshire.*

6. Mr. Kerr, the intelligent reporter of the husbandry of Berwickshire, has transmitted to me the following calculation of the expense of liming. The lime he used was brought by sea to Eyemouth ; and the price, besides carriage, amounted to 2*5d. per* boll, in shells, each boll containing four Winchester bushels ; hence to lime an acre of land with 35 bolls, will cost about £3, 15*s*., besides carriage and spreading, which, the distance being short, may amount to 10s. more, or £3, 5*s*. *per* acre ; and as this operation was usually repeated twice during a lease of nineteen years, liming, in his situation, may be considered as a yearly charge of 10*s*. *per* acre.

How astonished would not many farmers be in other counties, when they hear that Scotch farmers subject themselves to an expense of 10*s*. *per* acre *per annum*, for lime alone, a sum not much inferior to the average rent of land in many English counties. But the expense is well bestowed, were it only from the benefit thence to be derived in the cultivation of green crops of every description. For though such crops can be raised by large quantities of dung, yet where calcareous

* For a detailed account of this excellent method, as practised by Mr. Dawson, see the Farmers' Magazine for March, 1812.

substances are applied, as Mr. Brodie of Garvald has found by long experience, a less quantity of animal manure will answer the purpose. This is making the farm-yard dung go farther, with more powerful and more permanent effects; and from weighter crops being thus raised, the quantity of manure on a farm will be most materially augmented.

7. The use of pounded limestone, where fuel is scarce or dear, was strongly recommended by Lord Kames. He observes, that three pounds of raw lime is, by burning, reduced to two pounds of shell lime, though nothing is expelled by the fire but the air that was in the limestone, the calcareous earth remaining entire. Two pounds of shell lime, therefore, contain as much calcareous earth as three pounds of raw limestone. Shell lime of the best quality, when slacked with water, will measure out thrice the quantity; but as limestone loses none of its bulk by being burnt into shells, it follows, that three bushels of raw limestone, contain as much calcareous earth, as six bushels of powdered lime; and, consequently, if powdered lime possess not some virtue above raw limestone, three bushels of the latter, *beat small*, should equal, as a manure, six bushels of the former. These suggestions, however, have not been acted upon, probably owing to the difficulty and expense of beating the limestone sufficiently small. At the same time, the advantage derived from the use of limestone gravel in Ireland is, however, highly favorable to Lord Kames' doctrine.*

8. It is an ascertained fact, that lime is of no advantage in the neighborhood of Edinburgh, where the land has been long accustomed to aration and city manure. Mr. Allan of Craigrook, near Edinburgh, has given lime the fairest trial by liming one ridge, the whole field over, at the rate of 60 bolls *per* acre, and leaving the other unlimed, and he has uniformly found, that the liming has had no effect. The reason, probably, is this, that the land having been so often manured with Edinburgh street-dung, which frequently contains a proportion of shells, the use of stone lime is thereby superseded. Indeed, some are of opinion, that the land in the immediate vicinity of Edinburgh had been abundantly limed at some former period, which, in addition to the calcareous matter mixed with the street-dung, renders any additional liming unavailing.

Mr. Hume of East Barns finds, that lime does not answer on his farm near Dunbar, which he attributes to the great quantities of sea-ware, mixed with shells, which have been laid on these lands from time immemorial, and their having been formerly under constant crops of corn, and never in grass till lately, and even now only one year at a time. It is well known, he adds, that lime acts best on land that has been much in grass. Any local circumstances of that sort, however, cannot diminish the credit of a manure, of such essential importance to the improvement of the country.†

* It would be extremely desirable to ascertain whether limestone gravel might not be found in Scotland; to the discovery of which, I hope the attention of that public-spirited institution, the Highland Society of Scotland, will soon be directed.

† It is an interesting object of inquiry, whether lime is equally efficacious on the sea-shore, as in the inland districts? It is well known that gypsum is not. Sea-ware contains kelp, which, from the alkali it possesses, may act as a substitute for lime.

GENERAL VIEW OF THE IMPROVED HUSBANDRY OF SCOTLAND.

From Sinclair's Husbandry.

In a communication from my respectable friend, Sir Joseph Banks, he stated, that "agriculture has derived, is deriving, and will derive, more benefit from Scotch industry and skill, than has been accumulated, since the days when Adam first wielded the spade."

I hope that the following general view of the improved system of husbandry, as established in Scotland, will justify that observation.

The foundation of improved agriculture is certainly laid, in the best cultivated districts of Scotland, in as great perfection as it possibly can be in any country. The farms are usually of a proper size;—the farmers, in general, have capitals adequate to their cultivation; they are bound to pay the landlord such a proportion of the value of the produce, as renders it necessary for them to be industrious and economical, and to acquire all the skill, in the art of husbandry, to which they can have access;—their leases are commonly of such a duration, as to encourage judicious expenditure in the improvement of their lands, with the prospect of an adequate return;—the covenants contained in their leases are sufficiently fair, being almost, in every case, well calculated to promote, and not to retard improvement; a liberal system of connexion is established between the landlord and the tenant;—and the characters of those, by whom the labors of agriculture are carried on, whether farmers, apprentices, farm-servants, or common laborers, cannot be surpassed by those of the same description of life in any other nation. The experience of Scotland has likewise proved the superior advantages of having married servants on large farms; by means of which, the population of a country is increased, and the kingdom filled with sober, healthy, and industrious subjects.*

The various points which require to be attended to, previous to the actual cultivation of an arable farm, are in general ascertained, by the practice of Scotland, with a degree of precision hitherto unexampled.

The farmers of that country have established it as a principle, that the position of a farm-house and offices ought to make a material difference in the rent of a farm;—they have ascertained the best construction of farm-houses and offices, uniting economy and convenience;—they have pointed out the best size and shape of fields, by means of which, much land is rendered productive, that would otherwise be wasted in useless fences, and much labor in their cultivation saved, insomuch that where the fields are large, five ploughs will do as much work as six can in small fields, and every other part of the cultivation of a farm will be executed with less power, in nearly the same proportion;—they have likewise pointed out the inconveniences attending expensive fences, which are more ornamental than useful to a country;—they are fully aware of the importance of draining, and have practised it with success;—they have

* These particulars are explained in the three dissertations of Part 2.

ascertained, that by the introduction of good roads, the value of a country will be greatly increased ;—their instruments of husbandry are cheap, and well constructed ; their ploughs excellent, worked by two horses,* and peculiarly well calculated for general use ; and their carts superior to any other for agricultural purposes ;—their live stock are valuable, well calculated for their soil and climate ; and their horses, not only well adapted for the labors of husbandry, but maintained in such a manner, as to render them capable of performing a great deal of labor ;—in some cases they have tried a partial use of oxen with success, more especially in thrashing-mills ;—nor do they neglect to pay a proper degree of attention to the articles that ought to be raised upon a farm, according to its soil, its climate, its elevation and exposure, and its situation in respect of markets.

In regard to the actual cultivation of an arable farm, many points of infinite importance have been ascertained by the experience of Scotch farmers, in a manner the most satisfactory. They have ascertained the proper length, breadth, and shape of ridges ;—in the use of putrescent, and still more of calcareous manures, they have made great improvements ; they have proved, beyond the possibility of doubt, the advantages of deep ploughing ;—they have completely ascertained the advantages of summer-fallowing, where soils are either of a clayey nature, or are incumbent on wet subsoils ;—they have carried on with success, some essential improvements in the cultivation of various crops, in particular in regard to those important articles, turnips and potatoes ;—they have also brought to a high degree of perfection the course of crops calculated for different soils ; and have ascertained the rotations for which each description of soil is respectively best adapted ;—they cultivate in drills, beans, turnips, and potatoes, in a manner not to be surpassed for its excellence, and they have laid it down as a maxim, that crops of grain should be drilled, where the land is sown in spring, particularly where it is subjected to annual weeds ;†—they have also made some improvements in harvesting grain ; in particular, the plans of cast-iron pillars and bosses, are admirable inventions for a wet climate, by means of which, the harvesting of grain, and of pulse in particular, may be completed in half the usual time ;—they have brought the cleaning and thrashing of grain to the highest degree of perfection ; almost every individual, who has any claim to the character of a farmer, having fanners in his possession, and thrashing-mills having become almost equally general ;—they have carried, to a great extent, the practice of soiling horses, and even cattle ; and have proved, by decisive experiments, the superiority of that plan ;—they have restricted the practice of preserving permanent pastures within reasonable bounds, and have proved, that the convertible system of husbandry, may be generally adopted, to the great benefit of the landed proprietor, and of the public.

These are circumstances connected with the improved system of husbandry established in Scotland, the existence of which, I trust, is abundantly proved in the course of the preceding observations.

The result of this system is in the highest degree satisfactory. In all the corn districts, where the convertible husbandry is thoroughly established, greater crops are raised, and higher rents are paid,* than in any other part of the British dominions, and, what is equally remarkable, the condition or circumstances of those engaged in agriculture evidently bear the like marks of abundance. Without enlarging upon these matters in this place, I may only add, that the produce of crops, in good seasons, and in fertile districts, is calculated to be from 32 to 45 bushels of wheat, from 48 to 55 bushels of barley, from 60 to 75 bushels of oats, and from 30 to 35 bushels of beans, Winchester measure, *per* statute acre. As to green crops, 30 tons of turnips, 3 tons of clover, and 8 tons of potatoes, *per* statute acre, are no uncommon crops. Any system that can produce crops of so superior a description, even on fertile soils, is well entitled to imitation, more especially when it is accompanied with great economy in the expense of cultivation.

Forty-four years have now elapsed, since one of the ablest writers on agriculture in modern times, (Lord Kames,) pointed out the imperfection of Scotch husbandry ; and it is singular that, with hardly any exception, these imperfections have since been removed. Had it not come from such high authority, it is hardly possible to credit, that within the memory of so many persons now living, our agriculture could have been so miserably deficient as it seems to have been at that time. The learned Judge represents our instruments of husbandry as sadly imperfect ;—our draft-horses as miserable creatures, without strength or mettle ;—our oxen scarcely able to support their own weight, and ten going in a plough, led on by two horses ;—the execrable husbandry of infield and outfield generally established ;—the ridges high and broad, in fact enormous masses of accumulated earth, that would not admit of cross-ploughing, or of proper cultivation ;—shallow ploughing universal ;—ribbing, by which half the land was left untilled, a general practice ;—summer fallow, though common in three or four counties, yet only creeping on in others ;—over the greater part of Scotland, a continual struggle for superiority between corn and weeds :—the roller almost unknown ;—no harrowing before sowing, and the seed thrown into rough uneven ground, where the half of it was buried ;—imperfect rotations of crops ;—little skill in harvesting ;—no branch of husbandry less understood than manure ;—potatoes in general propagated in lazy-

* In Norfolk they use only two horses in a plough, but four horses are commonly allowed for each plough, two for a journey of five hours in the morning, and two more for another journey of five hours in the evening.

† It must be admitted, at the same time, that the drilling grain crops, is more generally practised in England, than in Scotland, but that is not the case in regard to beans, turnips, and potatoes.

* Mr. Curwen, in his Report to the Workington Society for the year 1810, p. 86, states the rent of fertile land in East Lothian to be, £6 *per* Scotch acre, and the produce, 40 bushels of wheat, 60 of barley, 90 of oats, excellent beans, weighty crops of turnips, and most luxuriant crops of clover. It is proper, however, to observe, that this is only applicable to the more fertile soils. A farm of 330 acres of arable land near Dunbar has lately been let at £8, 2s. *per* Scotch, or £6, 10s. *per* English acre.

beds;—swine but little attended to;—and very few farms in Scotland justly proportioned to the skill and ability of the tenant.* What a contrast to the description I have just given, of the husbandry of Scotland at the present period!

Among the circumstances which have occasioned so extraordinary, and so rapid a change, in the husbandry of Scotland, that turn for reading, by which the Scotch farmers are so peculiarly distinguished, though already pointed out, ought to be more fully dwelt on. Nothing can be more absurd than to imagine, that the communication of information by printing, which has promoted the advancement of every other art, should be of no use in agriculture. It is not recommended, that a practical farmer, should take for gospel what he reads in print, and should alter his whole system accordingly; but let him reflect on what he reads, let him try, on a small scale, useful experiments, and let him extend them when they are found to answer. At any rate, he may find in books a number of useful hints, which may be entitled to further inquiry. Hence the writings of Kames, and those of Anderson, Dickson, Home, Wight, &c. in Scotland, and those of Arthur Young, Marshall, and others, in England, gave a great spur to the improvement of Scottish husbandry, by directing the attention of the farmer to the principles of that art to which their lives were devoted.

The practice adopted by the Scotch farmers, of travelling to England, and in some cases even to foreign countries, removed a cloud of prejudices, which could only be speedily, and completely eradicated by ocular inspection.

No circumstance, however, had a more powerful influence in promoting a spirit of improvement in the northern part of the kingdom, than the formation of a Board of Agriculture; and from that era, in the opinion of the best informed agriculturists in Scotland, may be dated that wonderful change which has taken place in Scottish husbandry. In consequence of that establishment, as remarked by an intelligent farmer,† "a general desire seized all ranks to promote internal improvement. By means of that institution, great numbers of new men were brought forward to public notice, whose names otherwise would probably never have been heard of; and these being chiefly practical people, in other words, persons professionally concerned in farm management, agriculture, by their endeavors, was rescued from the hands of theorists, and a revolution of no small extent accomplished in rural affairs. Before the Board was instituted, the bond of connexion amongst agriculturists was slender, and served few useful purposes, each standing on his own strength and information, and unless in the case of those who travelled about to collect useful information, (and the number of those, at that time, was not great,) they new little more about the practices of conterminous districts, than those of China, or the most distant countries. The establishment of the Board did away at once all those evils and difficulties: a common fortress, erected for the benefit of all agriculturists, and to which each might resort for advice and protection, was immediately recognized. It made farmers, who resided in the most distant quarters of the kingdom, acquainted with one another, and caused a rapid dissemination of knowledge amongst the whole profession. It did more—the art of agriculture was brought into fashion; and this being the case, old practices were amended, new ones introduced, and a degree of exertion manifested, which had never before been exemplified in this island. The numerous surveys of husbandry, executed under the authority of the Board, were of singular advantage also, because they brought to light the practices of every country; and whilst they pointed out the obstacles which lay in the way of improvement, stated the most effectual methods of removing them. The very collision of argument, which such discussion occasioned, was of advantage, causing agriculturists to investigate the principles of the art which they professed, and inducing them to search after new channels of improvement. In a word, the Board, in a few years, collected a mass of agricultural information, hardly to be equalled, and not to be exceeded, by the accumulated stores of every other nation."

Mr. John Shirreff likewise attributes the rapid improvement of Scotland, to the interesting information communicated by the Board of Agriculture, at a time when the minds of men were qualified, from education and observation, to put a proper value on it, and whilst their capitals, arising from that powerful stimulus to improvement, leases, enabled them to execute those improvements which this interesting and various information suggested.

In a communication from Mr. Charles Alexander, a respectable farmer near Peebles, it is observed, that the publications of that Board, and other recent works on farming, in particular "The Farmer's Magazine," printed for the express purpose of promoting the views of the Board, were read with avidity; that a spirit of inquiry was thus excited, and that improved agriculture was universally considered to be *a sort of coining of money*. Hence a large share of capital, that did not originally belong to agriculture, and never was acquired by it, was thrown into the scale; an unprecedented competition arose for purchasing and leasing land; an increased spirit of agricultural improvement was the result, the effects of which soon became almost universally conspicuous.

The exertions of many other public-spirited institutions, in particular those of the Highland Society of Scotland, were of the greatest service; and a number of provincial societies, in their several districts, propagated the spirit with success.*

But information and skill would have been accumulated in vain, had it not been that, by the extension of paper currency, and the establishment of banks and branches in almost every county in Scotland, the farmers were furnished with credit, and supplied with the readiest means, of converting the produce of their farms into the circulating medium of the country, and were

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* See Kames's Gentleman Farmer, Appendix, Art. 1, On the Imperfection of Scotch Husbandry.

† See Brown of Markle's Treatise on Rural Affiairs, vol. 1, p. 20.

* The advantages of provincial societies are ably explained, by Sir George S. Mackenzie, in the Rossshire Report, p. 332.

thence enabled, not only to continue their exertions, but to lay out considerable additional sums on the improvement of their several occupations.

These circumstances combined, in addition to those already pointed out, will, I trust, account, in a satisfactory manner, for the great advancement that has been made in Scottish husbandry.

THE FARM AND FARMING OF THE REV. J. H. TURNER.—NO. IV.

For the Farmers' Register.

In my last, No. 3, I promised to take up the hacknied subject of rotation. But my pony (Monsieur Tonson again) stands at the door already caparisoned, and by her wistful looks, invites me to another excursion. I now have a strong bit on the frolicsome jade, and I intend to hold a tight rein, so that I think there is but little danger of her again running away with me.

I wish to say a little more about that harassing thing called *debt*. "A burnt child dreads the fire;" and I have been so hampered and harassed, and have suffered so much on this score, that I would warn all farmers against it, as one of the sorest and most inconvenient troubles that can come upon them. If any are already involved in this dreadful vortex, all I can say is, that they must get out—*as they can*. Nothing is easier than to avoid debt, when fairly out of it. Here, as in many other cases, one ounce of *prevention* is worth whole pounds of *cure*. It is simply to make the matter turn on these two questions: Do I really *need* the thing desired? And am I in circumstances to pay for it? If these two questions can be answered in the affirmative, then it is safe to buy. On any other principle it is always unsafe, and therefore all idea of purchase ought to be banished from the mind.

But it is really a little singular how very insidious this thing often is. The article wanted is a *little* one, and its cost a *mere trifle;* or the circumstances are so peculiar, as to constitute an emergency. The old carriage has become quite shabby, and wife insists upon it that a new one is indispensable; or Miss appeared at church with a new frock made up in the new fashion, and this attracted more attention from all the *young* people than the sermon did; and for this very *solid* reason, all the misses, whether their fathers can pay for them or not, must have a new fashionable dress also. It is also astonishing how important a bearing that word *decency* is made to have upon expenses of this sort. I *once* had a very exalted opinion of that word. I still think it a very comely one. But when I see that it is made the occasion of throwing aside the old carriage, or the old coat, though still comfortable, and of going in debt for new ones, I candidly confess that my attachment for the word is considerably weakened. The practice, with all its *decency*, is, to say the least, a very inconvenient one.

The propensity to buy things, not because they are *needed*, but because they are *cheap*, cannot be too strongly reprehended. The *men* are commonly keen enough at making a bargain; but the fair sex will excuse me when I say that, in this respect, they certainly take the palm from us. If a *good* bargain is offered, they cannot resist the temptation of making it their own. Good, prudent souls, like the industrious ant, they must be storing away for future wants. Some time ago, the following characteristic incident took place when I happened to be present. Madam had just returned from town, whither she had gone to purchase some necessaries for the family. After producing these, in which she seemed to take no particular interest, she proceeded to display, with great delight, the rich stores of *bargains* she had made. "See," said she to her good man, "here is a new shawl for Julia, and a new bonnet for Emily, and a new frock for little Sarah, all in the newest fashion. Now don't you think them very beautiful?" "Yes, my dear, I think they are; but," continued the good man, "I thought our daughters were already supplied." "They are," replied the lady; "but these were *so very cheap*. Why what do you think I gave for the whole?" "I can't tell, my dear," was the loving reply; "but one thing I know—that if you continue to buy things at this rate, because they are *cheap*, I shall soon be unable to procure *necessaries* for my family."

Our merchants, too, are often to blame in this matter. A customer enters the store. Both partners of the concern and all the clerks directly put on all the airs of their politeness. "Will you allow me to wait on you, madam? What will you have, madam?" And, without waiting for a reply, the shelves are immediately stripped of their contents, and the counter loaded with goods. "Pray, sir, don't give yourself so much trouble." "No trouble, madam; it gives me great *pleasure* to wait on you. See this beautiful goods—and cheap! I never had such cheap goods before. I bought it the other day at auction; and I can sell you the greatest bargain in town." Thus the voluble merchant runs on praising his goods, as the prettiest, the best, and the cheapest, until madam is induced to buy, perhaps beyond her ability to pay. The merchant will accommodate her as to credit also, and then raise a great clamor, that the *country people* will not pay their debts.

These were my cogitations during my excursion, and I hope the reader, ladies and all, will excuse me for presenting them just as they occurred. I now retire to the writing desk, and rotation in crops is the next topic that I am to treat of.

This, at various times, and in various forms, has been the fruitful source of discussion among our best and most influential farmers. Perhaps there is no subject, in the whole routine of farm management, on which more thought and ink has been expended. And even now, the contending parties seem as far from entire agreement as they were several years ago. Almost every farmer, especially those who go into the business on a large scale, seems to think that some rotation is necessary; but it is a rare thing to meet with two whose theory and practice precisely agree in this matter. The old rotation used to be corn and wheat, and then corn and wheat again. But finding that on this plan there was a constant falling off in the crop, until the land would produce neither the one nor the other, a *third* year was added, in which the land was allowed to rest. The rotation then was, corn, wheat, rest. To this was afterwards added a *fourth* year; and then the case stood thus: the first year a little corn, the second still less wheat, the third rest, as far as the

ravages of the famished cattle would let it have rest, and the fourth year a crop of briers, sassafras, persimmon, &c. So things continued, our agricultural prospects becoming more and more gloomy; our population starved out at home, and forced to the west in quest of land on which they could live, until some one conceived the idea of interspersing a grass crop, which has proved itself to be the great renovator of worn out lands. The rotations are now a vast deal more judicious than formerly. Indeed, I know of no rotation now, in which grass is not made to hold a conspicuous rank, and to this some have added peas and oats, to be turned in, in a green state. But still this subject continues to be a very vexed one, no general agreement having as yet been fixed on, as to how these several crops ought to succeed one another.

Hitherto I have maintained an entire silence on this question; and it has been a source of considerable amusement to me to watch the progress of that good natured and genteel controversy, in which some of our most worthy and substantial farmers are still engaged. And I think it more than probable that it would be good policy in me still to maintain the same attitude. But as I shall make an attack upon no person, nor upon the favorite system of any one, but simply express my own sentiments, I hope my fellow farmers will take them for what they are worth; and I hereby bespeak their kindness, that if they think proper to inflict upon me a castigation, it may be as moderate and gentle as possible.

And now, that I may enter on the subject at once, I would inquire, what is the great object of all farming, rotation among the rest? It is (if I mistake not) to derive as large a product as possible from our lands, and at the same time to leave them in a condition to produce as large or even a greater amount in the succeeding crop. If the crop remain uniform and stationary, there is evidence that the fertility of the land is the same; but if there be an increase or falling off of the crops, there is evidence of the increasing or decreasing fertility of the land. The power of production is therefore the great criterion by which we are to test the true condition of our lands.

Now the great desideratum in farming is to make the lands highly productive, and at the same time maintain them in a state of continual improvement. He who has arrived at this point, has reached, as I think, the "Ultima Thule" of good and skilful management. But the great matter is, by what rotation, or other expedient, is this to be effected? To this I reply, that this whole vexed question, on which there is almost as great a variety of opinions as there are different farmers to entertain them, is with me reduced to the limits of a mere "nut-shell." My theory is, that all crops whatever, whether corn, wheat, clover, or what not, especially if permitted to mature themselves, and then removed from the land, are, from their very nature, *exhausting*. This being conceded, the matter is made very plain. If the land undergoing cultivation is already rich, and we merely wish to maintain it in its present condition, all we have to do is to return to it an amount equivalent to that removed. Or if the object be to increase fertility, then the plan is to give it *more* than is taken away. And in adjusting this account, the land, if I may be allowed the expression, is rigidly and scrupulously exact. It will tolerate no cheating nor imposition whatever. If more be taken than a just proportion, the barn or corn crib will be filled, but it will be with a corresponding injury to the land. Whereas, if we proceed on a liberal principle, the land will not be outdone in generosity, but will open her kind bosom and pour forth a bountiful supply. It is, therefore, in vain, as I think, to talk of one crop as an enricher, and of another as an exhauster. They are *all*, grain, grass and every thing, exhausters; and they are exhausters in proportion to their own amount. If the crop be a heavy one, the exhaustion is heavy, but if it be a light one, the exhaustion is proportionably light. Now I do not wish it to be understood, that I consider all crops *equally* exhausting. Some for instance have broad leaves, for the express purpose, as I suppose, of deriving a large portion of their sustenance from the atmosphere. Now just in proportion as support is derived from this source, a less amount is needed from the land, and therefore less injury is done to the land in producing its crop. But the sentiment I wish to inculcate is, simply, that the injury done by one crop can never, by any rotation whatever, be repaired by another. On the other hand, this second crop, when removed, does but increase the injury done by the first.

But it will be inquired, do you advise a succession of the same crop on the same land, without regard to variation of any kind? To this I reply, that I see no objection to it, *provided* there is fertility enough in the land to sustain it; or in default of this, that the deficiency be supplied from some foreign source. The general theory on this subject, if I understand it, is the following: that the land contains certain ingredients; that some of these ingredients are suited to one crop, whilst others are adapted to other crops; and that these several crops, during their growth, appropriate to themselves only what is proper for them, leaving the residue to others which are to follow. Now, if this theory be true, then it follows that rotation is not only *necessary*, but that cropping cannot be carried on without it. This whole theory turns upon this one point: Are there in fact peculiar ingredients in the soil, suited to a particular crop; and may these be so taken up by that crop, as to render the soil unfit to reproduce the same? To this I reply, that there is one ingredient which, when exhausted, is destructive not only to *that* crop, but to all other crops, and that ingredient is *fertility;* and my theory is that this ingredient is just as necessary to one crop as another. I will, therefore, with the risk of a severe castigation from some brother farmers, frankly acknowledge, that I have no great faith in any rotation, from which regular supplies of manure of some kind are excluded. I will even go further, and say that, in my view, it makes but little difference what the succession of crops may be, provided there be a constant supply of enriching materials equal in amount to the crop which is removed.

And now, as I confidently expect to be attacked for this very heterodox sentiment, I will take the liberty of making my defence in advance. And here I would remark, that what I call fertility, a term understood by every body, is expressed by different writers by different names. Professor

Webster (I think it is) calls it *humus*, and Professor Dana calls it *geine*, and Liebig calls it *ammonia*. Now, without resorting to long quotations, which would merely cumber this piece and add nothing to the argument, I will simply state that these three learned gentlemen do agree that the above are the only ingredient necessary to the thrift of a plant; and that where they exist in proper proportions in any soil, that soil is a fertile one. Dr. Dana expressly says, (Second Report of the Agriculture of Massachusetts, page 165,) "if we can induce the state of geine best fitted for each plant, then adieu to the doctrine of the necessity of a rotation of crops." But in a plain discussion, such as this is intended to be, I would rather rely upon common sense, supported by observation, than upon any authority of the learned whatever. What are the *facts* then in the case? The Rev. Mr. Colman, commissioner of the above report, states it as a fact, that he saw a rich alluvion field on the Connecticut river, the proprietor of which told him that, without any manure, it had continued to produce good crops of wheat for *thirty* years in succession. In corroboration of this, I well recollect that, when I was a boy, my mother had her cotton patch, which continued to produce the same crop year after year, for I know not how long a time. There was also on the same farm a sweet potato patch which shared precisely the same fate. In addition to this, it is within my knowledge, and can be proved by hundreds of others, that the late Dr. Tazewell continued to cultivate corn on one of his lots near my farm, for more than ten years in succession; and that his last crop was inferior to his first, only in consequence of the exhaustion of the land. Here then is wheat, and cotton, and sweet potatoes, and corn, not one of which is dependent on a *rotation* of crop for their success.

But there is another department, in which cropping is going on, on a much larger scale, in which, as I think, I am borne out in the above position. This great department is the world, and the crops are the immense forests with which it is covered. Now here is a great crop produced, and according to my position, it must be at the expense of an immense exhaustion. Here too is no relief arising from rotation, for the same crop has been on the land for thousands of years. And yet this same good farmer, Nature, has so contrived, that without the least rotation in all that time, the fertility of all that land of which she has had the exclusive management, has not only been maintained, but has constantly improved. Nature's farm presents at this time a most singular anomaly of bearing an increasingly heavy crop for thousands of years in succession, and is at this day in better heart, than it was when she took it in hand. It is simply because nature's wants are all *real*, and therefore *few*. Her main object has been, what ought to be the main object of every farmer, to keep up the fertility of her land. And how has she accomplished it? Not by a rotation, but simply by returning the crop to the land which produced it.

But whilst nature has constantly set this wise and laudable example, man has come in, and though endowed with intellect, and calling himself the "lord of creation," has made a very poor affair of *his* farming. He has taken his little patches, and under the growings of his artificial wants, has taxed them to the full amount of their ability, and appropriating the whole products to himself, and giving back nothing to the lands, has reduced both them and himself to a state of beggarly starvation. And now he is trying to repair the injury, by a rotation of crops. This, as I think, is only calculated to make matters worse. When I see land refuse to bring one crop, I consider this as plain evidence that it will refuse to bring another. The rotationist however is of a different opinion. He tries corn, and fails, he then tries wheat, and fails also, his next effort is with clover, here is another failure, his last resort is to black-eyed peas, these may be *sprouted*, but there will be a failure in this crop also.

Now what can be the cause of all these successive failures? Some *special* ingredient is wanting is the soil. Yes! this is the truth. And what is it? Learned men call it humus, or geine, or ammonia; but I call it by the vulgar name of *manure*. Put manure on the land, and it will bring corn, and wheat, and clover, and peas, and any thing else, and that without regard to any particular rotation. The very best rotation, then, (and gentlemen will surely thank me for solving this difficult problem for them,) is that which brings the most frequent and plentiful supplies of manure on the land. With this medicine, administered not in broken doses, as timid physicians recommend their nostrums, but the whole portion swallowed down at once, I have never known any rotation to fail. Grain crops may follow grain crops, and grass crops may follow grass crops, or *vice versa*, and all will find in the soil the very *special* ingredient that they require.

But it was stated above that, in my opinion, some crops exhaust more than others. By this I mean that some have a more pernicious and injurious effect on the land than others. I have no doubt that grain crops are more injurious than grass crops. And why so? It is not because the grass does not, in common with the grain, take up the nutriment of the soil, and thus impoverish it. The fact is, both are exhausters, whether to the same amount, I pretend not to determine. One thing, however, is certain, that land will continue to produce grass longer than grain: and the reason is a very obvious one; for as soon as you remove the grass, it makes an effort to recruit itself, and I have known it to succeed in doing so, to the amount of the first crop. The second crop then falling and decaying on the land contributes materially to the fertility of the soil, and in this way we may account for the fertilizing effects of the grass. The grain crop, however, being wholly removed, and making no effort to recover itself, must necessarily be a rapid exhauster.

But it will be objected, that by following nature's model, as so much lauded above, we shall defeat one great object of all cultivation, which is to supply our numerous wants. Nature, it will be said, has but one want, and her whole crops go to the supply of that one; whilst man has numerous wants, and therefore cannot be equally generous. To this I reply, that the farmer's *greatest* want is rich, productive land. His first care ought therefore to be to supply this want; and if he can but succeed in this, he will find no great difficulty in supplying all other reasonable wants. Fertile lands will fill his corn-crib, and plenty of corn will

not only make his hogs merry, but will diffuse an air of cheerfulness over the whole establishment. But here is the rub. After nature's law has been violated, and by frequent removals of the whole products, positive impoverishment has ensued, how is the land to be resuscitated? To this I reply again, that here is a case that is plainly beyond the reach of any rotation in cropping. It is, however, a matter of comfort, that land labors under but one single disease, and that is poverty. It is, however, highly infectious; for it is almost sure to communicate itself to the proprietor, and then it spreads through the whole family; and when the land, proprietor, and family are all down together, the case is really a bad one. But even in this event, discouraging as it may seem, there is a remedy. Swaim, with his panacea, and Brandreth, with his pills, have each pretended that he has discovered a remedy for all the "maladies that human nature is heir to." Now I pretend to no quackery in human diseases, but I do think I have found a specific for the only disease that afflicts the land; and this specific is not rotation, but enriching manures of some kind. How these manures are to be obtained, I shall not now, of course, attempt to explain. Every one acquainted with the circumstances with which he is surrounded, must judge of this matter for himself. I will, however, just remark, that whilst a deficiency exists in one point, there is commonly a superabundance at another; and that it requires but little skill so to concentrate one's resources as to make them most available.

After the above statement, the reader will not be surprised when I inform him that in my practice I rely but very little on any system of rotation whatever. In fact I rely scarcely any on this source, to keep up the fertility of my lands, much less to increase it. My main crop for market is hay, and every thing is conducted on my little farm to make this crop as large in amount, and as good in quality, as I can. The fields are, therefore, continued in grass as long as they will produce a fair crop. When the fields become so infested with greensward and other filth as materially to lessen the crop—which is uniformly the case on all the high lands in three years, and sometimes in two—they are then ploughed up, and a corn crop is resorted to, to cleanse them. Some time ago, when my lands were less fertile, one crop of corn was sufficient for this purpose. It now requires two, and these in immediate succession. My system of alternation therefore is, two crops of corn, one of oats, and three of grass; and this I adopt not with the view of improving or even keeping up the fertility of the lands, but simply because I consider it as the best course in reference to my main crop.

The reader will not also be surprised when I tell him, that I never tolerate any grazing in any field, or at any season of the year. I have seen the idea advanced, and that too by thrifty farmers, that grazing was beneficial to the lands. I will believe this when I am convinced that the right way to keep up strength is to take away all the sustenance by which it is maintained. No one pretends that the removal of a crop adds any thing to the fertility of land. But what is the difference whether it be removed by the cart, or by the capacious stomachs of cattle? But it will be said, that in the latter instance it is again dropped on the land. True, but these droppings are so dispersed, and at intervals so wide apart, that every one must see that they do but very little good. There is one event, and but one, in which I would approve of grazing, and that is where the farm is a large one, the grass abundant, and the market too remote to carry the crop there in any other way. But in this case, the animals should be penned every night, and thus the manure concentred and made available. But it will be said that the *hoof* is necessary to the solidity and compactness especially of light lands, to make them produce wheat. But I should think that the same, or even a greater amount of compactness, might be secured by a heavy roller, and thus save the fields from the severe scourge of the animal's tooth. A fall fallow, late in the season, will ordinarily secure the succeeding crop of corn from the depredations of worms. But my paper is again too long. I therefore merely throw out these few hints for the present. At some future time I may resume the subject. The probability is that I may prepare one or two more numbers, but at present I cannot say on what subjects. The fact is, the season of the year has now arrived when farmers ought to go to work, and I am much more ambitious for the fame of a *working* than of a *writing* farmer. J. H. TURNER.

CHOICE OF LANDS.

From the South Western Farmer.

Many are every day emigrating to our state, and we hope before long to see the tide increased. Many too of our present settlers are every year adding to their clearings—and spreading cultivation farther into the ancient woods. For the benefit of such we propose to give a series of articles on the choice of lands, and the marks by which good and inferior lands may be distinguished in our climate. We have been to a considerable extent over the country, and have had some experience in this matter, but we know there are many better acquainted than we are with the subject; and the chief good we hope our articles to accomplish is, to excite the attention and aid of such individuals to the matter.

The most certain and simple manner of judging of the qualities of lands is by the peculiar growth. With prairies, where this mode of course could not be practised, we have little acquaintance, and we know no certain rule for ascertaining the qualities of such lands except analysis. We will before long get the apparatus necessary for this, when we will endeavor to give more particular information on every branch of the subject. But upon timbered land every farmer knows that the liability to overflow in swamps—the adaptation to cultivation—the richness of the soil—and its fitness to carry particular crops,—may all be ascertained by inspecting the peculiar growth the land in a state of nature produces.

We will take the varieties of trees, &c. in alphabetical order, and to give more utility to our articles we will add remarks on the qualities of the particular kinds of timber.

Apple, wild crab.—Though occasionally found growing on dry spots, it generally denotes a cold, tenacious, poor soil, and one which will be too

wet in the spring for cultivation. It is most common on the borders of low wet prairies.

Ash.—A plentiful, large growth denotes very superior land. It is never found with us on poor land; and except on the best it is scattering and small. In swamps the ash, with the butt growing up for some distance much larger than the trunk higher up, and the inequality ending abruptly, is a certain mark of frequent overflow. The ash denotes good corn land, and we would suppose equally a mark of land adapted to small grain.

In this country we are without the white or swamp ash found at the north, and so much used in carriage making, &c. Our ash is not tough and hard like that, but has an open grain, and is among the most *brash* or *breakly* of our timbers. It is very dry and makes better fire wood when green than any other tree we have. Its ashes have also been found among the most valuable for lie. The ash lasts well exposed to the air, but soon rots when buried. In common with all the trees which have a large portion of their trunks sap, the ash can seldom be deadened so as to die the first year.

Beech denotes good second rate land with us, and is never found except on loose mellow soil, which may never produce the best, but is very reliable for certain crops.—It is sometimes found in swamps which overflow, but in none which do so often and to any depth. Beech, like the ash, lasts well in the air, but soon rots when buried. The tree is easily deadened by taking out a thin chip in circling it.

Box elder.—This is one of the semi-dwarfish trees, and grows only on rich ground. To find it spontaneously attaining any size, therefore, is a certain mark of a good soil. It will grow in overflowed land, however. Of the qualities of the timber we know little. Its bark and leaves are said to possess valuable medicinal qualities.

Cotton wood.—This is a tree which never attains its growth except on the richest soils, and is never found naturally on any other. Though generally found in swamps, it will occasionally be seen on uplands which are rich enough. It will grow on overflowed soil. The timber is light and porous, and of little value, though it makes tolerable fence rails, and when dry pretty good fire wood. It rots almost immediately in the ground. It is not easily deadened, except by firing at the roots, the first year.

Cherry.—The wild cherry common among us, never attains a size over a foot or two through, except on the best soil. It denotes too freedom from overflow when found in bottoms. It is easily deadened, and the wood is extremely lasting and valuable in any use.

Cypress is an unerring mark of low, overflowed swamp land. When cypress land is reclaimed, however, it is found to be mellow and productive, and the tree is easily deadened. Though soft and porous, cypress is a most valuable timber, splitting out easily into shingles, &c.—easily sawed into lumber—and either in the ground or in the air extremely lasting.

Cane.—To see the large high cane we once had so plentiful among us—attaining the height of 25 or 30 feet—is a certain mark of the best kind of soil. On poorer soils it will never attain its full growth. Overflows kill it. So that in swamps subject to overflow, it is seldom found at its full size. It takes some six or seven years for it to grow to full size, and unless the land has been exempt from overflow for that length of time, large cane will not be seen. It goes to seed at long intervals and then dies spontaneously. It is a variety of the same species as the bamboo. In another article we will give a history of its seeding and growth.

Dog-wood.—This is another tree of semi-dwarfish growth. It is never seen on the very poorest land. But from that which is thin to the richest it is found flourishing in all. To find it growing in swamps however denotes exemption from overflow. The tree is too small to make the timber worth notice.

Elm.—This tree will not grow over a foot or a foot and a half through, except on rich land. It will not grow on lands much subject to overflow. It is easily deadened. And the heart of the tree is extremely tough and lasting, both in or out of the ground. It is used by our wagon makers for the hubs of their wheels. Also, for the screws to our cotton presses. The bark of the slippery elm is well known to have valuable medicinal qualities. The wood however is not so tough as that of the red variety.

Gum.—The black gum grows indiscriminatingly, on thin and rich lands. Its superior size on rich lands however is a distinguishing mark. It is not easily deadened the first year; and the timber is of little value—being too tough to split and shrinking and cracking very much in seasoning. The sweet gum, of the size of 4 feet and over through, is a very common tree in our rich bottoms, and on poor land is seldom seen except of a small size. It is a difficult tree to deaden; and the timber is nearly worthless. It rapidly rots in any situation.

Hickory, of a small size, growing thickly or predominating, denotes a good soil, though shallow. Large sized trees are found occasionally on rich and deep lands. The common kinds are seldom found in overflowed lands—but a variety with rough scaly bark found in swamps is a certain mark of inundation. The timber is too well known to need description. It is not lasting, and soon rots in the ground. The hickory to be deadened the first year must be chopped round entirely through the sap; unless this is done it will continue vigorous to the second summer.

Holly.—This tree is a certain mark of good land. It is semi-dwarfish—difficult to be deadened—and loves swamps which are not much overflowed. The timber is very white and close, and is used by cabinet makers for inlaying.

Haw—black.—This shrub denotes rather a thin soil, never being found on our richest. It grows only in dry spots. Of the *red* there are two kinds, one with many thorns and a fruit much larger than the other—nearly the size and shape of the crab apple. This kind grows only on high dry spots, denoting a poor soil. The other has the fruit of a smaller size in clusters, and sweeter tasted, and the tree grows taller and is freer of thorns. This kind loves swamps and low places, and generally denotes a rich soil though wet and tenacious.

Hornbeam, or iron wood.—This is another sem-idwarf, and denotes, like the beech, good second rate land—never being found on either the richest or the poorest.

REJOINDER UPON THE SUBJECT OF MANURES, &c.

To the Editor of the Farmers' Register.

Sandy Point, May 15, 1842.

Please to afford me a small space on your pages to reply to the remarks of the Rev. Mr. Turner, on my strictures on his anonymous essay on manures, &c., which appeared in your January number. From the general tenor and train of ridicule in his remarks, he doubtless intended that they should act as an extinguisher, and sweep all such ephemera from his path in future, even when he chooses to write anonymously. I have not failed, Mr. Editor, to appreciate the agricultural writings of Mr. Turner, and to pay to his known and subscribed opinions a respectful deference.

In his remarks on my strictures relative to his mode of managing stable manures, he says, "By what management can manure be most rapidly increased? Is it by daily throwing it out in small quantities, &c.?" In reply to which I here repeat, as the result of my own experience, and that of the majority of the most intelligent and experienced farmers and horse owners, that, from a due and prudent regard to the comfort and health of the horse, manure ought *never* to be allowed to accumulate in the stable beyond 24 hours, and if oftener cleaned out the better; and I do assert that, by cleaning out the stable daily, a greater amount of manure, and that of a better quality, can be made, than by allowing it to accumulate in the stable. Were I asked "what would be the surest mode of obtaining *fire-fanged* manure?" I would unhesitatingly reply, "allow it to accumulate in the stable;" and foul stables are well known to excite and aggravate many of the diseases to which the horse in his domestic state is liable. It is rather a singular doctrine for the reverend gentleman to advocate and recommend—the permitting of a *known* evil, that (doubtful) good may result. "An ounce of prevention is worth a pound of cure."

In the printed report of the "Proceedings of the Henrico Agricultural Society, for October, 1841," I see it stated by Mr. Turner that, from 21 head of horses, mules, cattle, and a considerable number of hogs, he had manured the preceding season 10 acres of land, at the rate of 25 cart loads per acre, (as gathered from a preceding portion of that report.) Now I can tell him that, on this estate, with an equal number of mixed stock and the mode of management here pursued, not less than one-third *more* than that quantity of land has this season been manured; and that from all sources, and these none other than domestic, since the month of November last, not less than 180 acres of land have been heavily top-dressed.

The stables for the horses and oxen occupy each one side of a large square, in the middle of which is a place of deposite for the manure, deepened in the centre, having a stiff and retentive clay bottom, gradually rising to its outer edges, around which there is a sufficient bank raised, and so formed as at all times to afford a dry and comfortable footpath all around the square. Both stables are thoroughly cleaned and swept out every day, and the floors plentifully sprinkled with ground gypsum, the probable benefit likely to result from the daily application and consequent mixture of which with the manure need not be here described. A regular and large supply of fresh litter in the shape of clean and dry wheat straw, and none other is used, is also daily applied. Amongst this manure no hogs are permitted to root, nor is the manure allowed to accumulate to any injurious extent, being hauled out as frequently as opportunity offers, and applied as a top-dressing to clover, at any period of the year, and always with decided advantages; and it is indeed a very rare circumstance to find amongst the manure any degree of fire-fanging.

Mr. Turner very pointedly refers to "the very large quantities of marl and burnt shells" used on this estate, but I think with an incorrect inference. The proprietor of this estate, his manager and many others in this neighborhood, entertain the perhaps singular belief, that putrescent manures can only be applied with permanent advantage on soils that are either naturally or artificially rendered calcareous. If there is error or fault in this belief, Mr. Editor, you have here, amongst your other *little* peccadilloes, a heavy account to answer for. I will here, however, aid you with one of *many* proofs of the correctness of the positions which you laid down as to the true operation of calcareous matters when applied to the soil. In the spring of 1840, a portion of land on this estate had a heavy application of putrescent manure. About 200 hhds. of shells were applied to one side of this manured land, the remainder then and now remaining unlimed. On the whole, corn was planted, followed by wheat and clover, to both of which crops the benefits from the lime were very obvious. This spring that portion not limed was again heavily top-dressed, and none applied to that which had been limed. The whole was grazed partially by sheep until the beginning of this month. From the limed portion we are now daily cutting a very good growth of clover, for the purpose of soiling, [feeding green,] while on that which had not been limed, but which had the benefit of an extra dressing of putrescent manures, there are only a few straggling plants of red clover to be found, with a tolerably close and low growth of white clover and natural grasses. Were a person to pass over these portions of land blindfolded, he could from the difference of growth tell when he came to the dividing line between the limed and unlimed land.

In reply to Mr. Turner's "set-off," to my objection to pen-feeding cattle, I will take the liberty of stating, that if he has "never been able to secure health and cleanliness by any other mode, "than by pen feeding, he has never properly practised stall feeding. And the case which he instances in his effort to fatten one of his steers is a proof of it; for no animal that is properly stalled and taken care of can by any possibility other than carelessness become covered by his own filth. Both modes I have seen fully tested, and under circumstances as favorable for pen feeding as Mr. Turner has adduced. The benefits of stall over pen feeding, for all animals which are required to labor daily, are I think very obvious. On this estate, all of the working oxen have been stalled when out of yoke, since the beginning of March last, when their stables were ready for their accommodation. And I am fully warranted in saying, that from their improved condition and efficiency for labor since that time, one fourth is added to their value, and of a

morning, as to any of their filth which adheres to them, Mr. Turner might pass his cambric handkerchief over both their flanks and sides without materially soiling it. Out of 30 oxen which have been regularly at work for the past ten months, several good beeves could *now* be selected, with skins as sleek and clean as could be desired; and I may also add, that these 30 oxen, with the aid of 4 others occasionally to relieve the weaker individuals, have executed all of the spring labor formerly performed by a number of animals varying from 42 to 48; and not a single instance has occurred of a steer failing to perform the daily labor required of him.

I now come to that portion of the reverend gentleman's remarks where he became "at once fully convinced that Mr. Nicol did not know against whom he was hurling his shafts." Let me here, Mr. Editor, compliment his sagacity in becoming "convinced" that I did not know who was the writer of an *anonymous* essay appearing in your pages. I had no intention of attacking his "strong forte," or his hog management, further than was implied in his mode of making them manure raisers, as gathered from his anonymous essay. Suited to his peculiar circumstances, his hog management, for aught I know, may be the very acme of perfection, and in his opinion I doubt not it is so. The price which he obtained for his eight months old boar was really good. But was it sold to the butcher or fancy hog breeder?

As to Mr. Turner's "one word more," I will not give insult, by believing that any of his intelligent neighbors would be guilty of so much rudeness as *to laugh* at any individual, however humble his station, or homely his mode of expressing himself, who would *honestly* express a dissent from the anonymous opinion of Mr. Turner or any other person.

The concluding passages of the remarks require no comment; their evident drift and intention is sufficiently plain; and with an apology for occupying so much more of your space than I had intended, I am, Mr. Editor, your humble servant,

A. Nicol.

It is unpleasant to us at all times to have controversy, on agricultural subjects, conducted between any of our correspondents in any other than the kindest feeling towards each other, and with the single object of eliciting truth by discussion. It has therefore been to us a subject of regret, that any asperity, or expressions that could give the slightest offence, should have found place in this controversy between two persons, to whose contributions we attach high value. Each, in turn, has thought himself aggrieved, and claimed the right to reply; and each has now been permitted to "shoot his bolt," or to "have the floor," in reply to the other's strictures, and though not as fully as he desired, to the full extent that we deemed admissible and proper. And now this controversy must stop here, or at least as to any thing farther that would apply to the person or the particular opinions of the opposite party. We have taken the liberty to prune from the articles, on both sides, some passages which were too pungent. For this we crave the pardon of both writers, and fear we shall have the thanks of neither; usually happens to the unlucky editor in such cases, we may have somewhat offended both the opposite parties, not only by what we have admitted, but also by what we have refused to admit. It is scarcely necessary to add, that the communications of both these highly respected correspondents, in support of their own opinions and practices, without too pointed condemnation of others, and whether on the points now in question, on any others, will be always most welcome to the pages of the Farmers' Register. —Ed. F. R.

WIND PUMP, FOR KEEPING LOW MARL PITS FREE FROM WATER.

To the Editor of the Farmers' Register.

I met with a gentleman from Eastern Virginia, more than a year ago, in the steamboat, who professed to be a farmer, and a subscriber to the Farmers' Register. He spoke of great improvements made by the use of marl, but said, in Mathews county, his residence, though marl had been found in many places, the land was so low and so flat, and water rose so near the surface, the use of it had not been attempted. I told him that I knew a farmer in the low lands of Talbot county, Md., who, under the disadvantages he mentioned, was working a pit much to his profit; and I promised, at his request, to make a communication on this matter in the Register.

Mr. John Dawson, the proprietor, informed me that after a painful search he found a bed of marl, on the banks of St. Michael's river, eight feet below the surface, and on a line with the river, and, upon removing the superincumbent earth, much water rose in the pit, which he drew off by means of a sweep and bucket, and worked in this way for some time. An uncommon high tide overflowed the banks of the river, and filled his pit. To clear it by the means he had been using, he deemed hopeless. Some person recommended to him to apply to Mr. O. Hussey, a skilful and ingenious mechanic of Baltimore, who constructed for him a pump, worked by the wind, which drew off the water. He still continues to use it, and the water now is no obstruction to his operations. By means of an inclined road he now gets marl with much facility. I saw the contrivance and was much pleased with it, and have no doubt but in Mathews, or in any other level country where the water cannot be drawn off by ditching, it might be advantageously used.

The cost of the pump, with the appendages, was one hundred dollars. If it should be deemed too expensive for one farm, by selecting a convenient spot it might serve for two or more.

I have forgotten the gentleman's name to whom

I have referred. If this shall come under his observation, he will see that, though the performance has been delayed, the promise was not forgotten.

WM. CARMICHAEL.

Wye, Queen Ann's co., Md., April 30, 1842.

NEW AGRICULTURAL SOCIETIES.

Two Agricultural Societies have recently been organized, one in the county of Prince George, and the other in King William, and both upon the *working* plan, recommended in the last December number of the Farmers' Register. The form of constitution there published, with a few changes of unimportant details, has been adopted by both these societies, and therefore it is unnecessary to publish the forms of constitution actually adopted. The plan requires that every member shall *do something* in furtherance of the objects of the institution, by accurately conducting and carefully noting, and reporting some one or more agricultural experiments each year. And if this be but done, the most unpretending labors of a society in any one year will serve to establish some useful truths; to indicate something of new practice, and beneficial and profitable to be performed; or something of old, useless or injurious, to be omitted and avoided; and this will be more than is generally done by other agricultural societies. But even the best devised plan of constitution and of operations for a society alone, will not be sufficient to make a society useful, unless the requirements of the plan be truly and faithfully obeyed by the members. We earnestly hope that there may be no such deficiency in these two societies; and they have our hearty and zealous wishes that their usefulnes and their success may entirely fulfil their design and objects.

REMARKS ON THE CULTURE OF INDIAN CORN, IN REPLY TO THE EDITOR OF THE CULTIVATOR.

From the Southern Agriculturist.

Dear sir.—In looking over the first and second volumes of the Cultivator, my attention was particularly attracted by the following editorial remarks on the subject of Indian corn and its culture, namely: "The roots grow to as great a length as the stalks;" and "In corn ground we think six to nine inches a suitable depth" in ploughing, as "the roots will strike fully to this depth if there is food for them."

Now, as there could be nothing more absurd than to maintain that a plant, five to ten feet high, has roots as long as itself, and that these roots go down perpendicularly, and yet reach no lower than eight or nine inches below the surface; the conclusion is obvious, that the editor believed in the horizontal distribution of the roots of corn as a general rule. Having had no opportunity of ascertaining, from personal observations, what the fact on this point is, in the soil and climate of that latitude, I notice this opinion of the Cultivator, not for the purpose of denying its correctness in so far as it may apply to that section of the union; but to show, that however well founded there, it is not altogether in accordance with facts here. And with this view, I shall state the general results of examinations of this plant, repeatedly made, in order to satisfy my own mind on this point.

It is not intended here to deny the existence of horizontal roots to the corn plant, (a fact with which every planter is no doubt familiar); but to call attention to the no less important fact, that these roots, however indispensable may be their functions, are not the principal in size, but are given off from other and much larger roots, which go down perpendicularly or nearly so, to a depth under favorable circumstances of several feet.

The plants first examined grew in a very light sandy soil, incumbent on a loose subsoil of yellow and white sand many feet deep. Here, upon carefully removing the earth to the depth of two feet, all the large roots were found running down perpendicularly; or at least so nearly so, as to be embraced in a circle of eighteen or twenty inches diameter, at a depth of two feet below the surface. More surprised at first, than satisfied with this discovery, I examined a number of other plants in the same manner, but with the same result; and was, of course, compelled to abandon the opinion previously entertained, that the main roots of the corn plant were all horizontal. These plants averaged about twenty-five perpendicular roots, some of which were traced two feet nine inches, when they were snapped off; and, upon comparing their diameter where broken off with that a foot above this point, it was evident they must have penetrated at least a foot deeper, making their entire length not less than three and a half to four feet. It should be remarked, however, that occasionally one of these large roots was found so bent in its course, as to run parallel with the surface: and further, that in one or two plants the majority of the roots diverged at such an angle, that they could not be strictly considered either perpendicular or horizontal. But these were plainly mere exceptions to the general rule. With regard to the horizontal or lateral roots, it was observed that the degree of their developement seemed to depend mainly on the condition of the soil, (properly so called,) and the season. Where the former was poor and the latter dry, but few of them, apparently, exceeded two or three inches in length, while many were much shorter. On the other hand, where the soil had been made very rich by high manuring, more especially if a wet season concurred, these roots were very much increased, not only in numbers but in all their dimensions, a large proportion of them extending from one to two feet or more from the stalk. All other things being the same then, these roots (the lateral) would seem to be developed on the one hand, in proportion to the fertility of the soil; and on the other, to the degree of humidity of the season; attaining their

utmost size under a concurrence of wet seasons and high manuring, and their least under the opposite contingency. There appear to be good grounds for believing, too, that wherever circumstances favor the growth of one of these classes of roots, that of the other is correspondingly retarded.

With a view to ascertain whether or not this disposition of the roots of the corn plant were affected by the texture of the soil and subsoil, several plants were next examined, growing in a close and heavy soil, based on a stiff subsoil, consisting principally of clay with some sand. But here, also, the same law was found operating in giving a downward tendency to the main roots. They were observed, however, to be more numerous, and to reach an average depth of only two feet, their progress downwards, being no doubt obstructed by the resisting quality of the subsoil. The horizontal roots, though of smaller diameter than the perpendicular, were so much more developed than in the former case, especially when favored by a moist and mellow soil, as to traverse and occupy the entire intervals (a space of five feet) between the rows.

The results of the above examinations certainly go to show, then, that the opinion of the Cultivator is not in strict harmony with facts, at least in this locality: that, in short, the principal roots of the plant under consideration, so far from penetrating only eight or nine inches below the surface, actually reach a depth of several feet; while the horizontal, which that journal seems to regard as the principal roots, are, in point of fact, smaller (though often longer) ones given off from the former. It has been seen, moreover, that the relative dimensions of these two sets or classes of roots are not always the same; their respective developements depending, as they do, on the controlling influence of the several ever varying causes enumerated.

We cannot reflect on the foregoing facts without at once perceiving, and, in some degree, appreciating their practical bearing. Nor can any one, acquainted with the habits of this plant, fail to discover the wise adaptation of means to the end displayed in the number and position of its larger roots. One happy and very obvious effect of this arrangement is, a degree of exemption from the effects of drought, which could not be enjoyed under any other. Hence it is that corn, although so susceptible of injury from this cause, does not suffer more from it. For it cannot be questioned that, with its present physiological constitution unchanged, the harm it would sustain would be much greater were its roots horizontally placed, and of course near the surface. Indeed, this fancied position of its roots can never sufficiently account for the readiness with which this plant suffers from drought. This phenomenon is clearly referable to nothing else than the organization of the entire plant itself. The most obvious of its features—its size, the well-known porous structure of its stock and leaves—its rapid foliar transpiration, &c., sufficiently indicate the need of a quantity of sap both absolutely and relatively large. Now, as water is essential to the formation of sap, and constitutes such a large proportion of it, it would seem evident that this plant, which contains so much sap, must require a corresponding quantity of water, and must suffer sooner for the want of it, than if its relative portion of sap were much less.

Indulge me here, Mr. Editor, with a remark or two on this point relatively to the cotton plant. Its capability of resisting drought has been attributed, in a published communication, to its tap-root. This, it is supposed, by penetrating to a great depth, furnishes a supply of moisture sufficient to enable it to withstand a drought, by which corn would be seriously injured if not destroyed. In order to determine the truth in this matter, I have pulled up and examined a great many plants after the 15th or 20th of July; but have found a large proportion of them with no tap-root at all: while in others this root had either assumed a lateral direction, or had become so diminutive in size, and inferior to the lateral, as to be evidently incapable of the effect above ascribed to it. Yet these plants were as little affected by drought and as productive as the tap-rooted. Now if the latter resist drought by virtue of their tap-roots, by virtue of what do the non-tap-rooted plants resist it? Were it this root alone that conferred immunity from the effects of a dry season, one might expect during such a time easily to distingnish between them while growing; but this, it is believed, cannot be done; and it is more than probable that the relation of this plant to the season is as little controlled by its tap-root as that of the corn plant is by its horizontal roots. The former, whatever may be its degree of succulency, becomes gradually more and more woody, until at maturity, it acquires the closeness of texture and hardness of many shrubs. While, on the other hand, the stalk of the latter is more or less occupied by a pith so filled with sap that it may be wrung from it almost as water from a saturated sponge. Were equal portions, by bulk, of cotton and corn-stalk, at the same period of their growth, deprived of their sap, the quantity from the former would doubtless be much less than that from the latter: for the very obvious reason, that the dense and compact structure of the one is incompatible with that capacity for sap existing in the very light and porous pith of the other. Hence it would seem safe to conclude, that cotton, containing, as it does, less sap, requires less moisture than corn; and is, of course, better able to sustain itself during drought, even supposing the relative activity of the leaves to be the same in both plants. This opinion is corroborated by the effects of the great drought of 1839 on some of our forest trees situated in certain high and thirsty localities. The oaks, so far as I observed, exhibited no evident symptoms of injury, while the pines growing among them lost, in some instances, a moiety of their leaves. Here then the case of cotton and corn is reversed; the tap-rooted plant suffering least in one case, and most in the other. This, it is conceived, can only be explained by reference to a difference of organization; the result of which was, that the pine, though fortified by an immense tap-root, became the earlier and greater sufferer. * * * * * * *

L. Reeve Sams, M. D.

INTERESTING TO COTTON GROWERS.

From the Memphis Enquirer.

Panola Cy. (Miss.) Jan. 26, 1841.

Mr. Editor,—It is usual for cotton growers to sun their cotton as they gather it, and then gin it as early as possible. This, according to my judgment and experience, is clearly wrong. Cotton should never be sunned, unless it be such as has been gathered quite wet with rain; nor should it be ginned until it has been heated.

Heat diffuses oil, and we know there is a large quantity in cotton-seed. Now, sir, put it together as you gather it, both morning and evening, and there is sufficient moisture to make it heat. This being the case, the oil in the seed is diffused throughout the lint--for it cannot evaporate. When it remains in this situation a sufficient length of time to spoil the seed, the cotton should then be thrown up and cooled. Care should be taken not to let it turn blue:—this, however, is not so easily done as you might suppose.

The process of turning over and throwing up will likely have to be repeated two or three times before the seed are entirely spoiled. The trouble of overturning and tossing it up in the cotton or gin house is not greater than sunning it on a scaffold. By this process you gain the weight of the oil which is diffused throughout the lint, and which gives the cotton the oily gold color which is desirable, and also that elasticity and adhesive quality, like wool, which never fails to enhance its value.

But, sir, there are other advantages growing out of this operation: the gin will pick at least one-sixth faster, and clean the seed much cleaner when the cotton has thus been compressed together; and instead of cutting off short particles, as is always the case when the cotton is open and fresh, the saws take it off in large flakes, thereby making the staple longer and stronger.

Every farmer knows that his early cotton outweighs, and has better staple than his late cotton; and he also knows that the earlier it is gathered after it opens the better. Now, sir, these facts show the correctness of my theory; for exposure to the sun and rains evaporates the oil from the seed and makes the lint short and light.

Farmers should secure in dry weather and from evening pickings, in a house to itself, or a portion of the gin, sufficient of dry good cotton, to make seed, but the balance of their crop they should be sure to subject to the process of heating and cooling in the shade. It is said that the British East India cotton is vastly inferior to ours at present. If we can make our cotton still better, the danger from that quarter will be lessened.

ASPARAGUS.

From the British Gardener's Chronicle.

A few weeks since, we reported briefly the substance of a paper upon the cultivation of asparagus in the north of Spain, which was communicated to the Horticultural Society by Captain Churchill, of the Royal Marines. This gallant officer was at St. Sebastian during its occupation by General Evans; and he profited by such leisure as his military duties afforded him, to make himself acquainted with the natural history and horticulture of Guipuscoa. We might content ourselves with merely referring the many inquirers who want to know how to grow asparagus well, to the report just alluded to; but in our opinion it is much too important to be passed with so little attention.

Asparagus is probably the vegetable most generally admired and most seldom well cultivated; it is only here and there that it is large, tender, and delicate. In country gardens it is small, green, and strong; in the London market it is long, white, hard, and tough—to the eye attractive enough, but to the taste more like bleached timber than an esculent. Indeed, we have never been able to comprehend the reason why, in this our age of improvement, some ingenious turner has not produced imitation sticks, which might be tipped with half an inch of eatable asparagus, and thus spare the necessity of cooking four-fifths of the stuff that is brought to a London table. Covent Garden asparagus is assuredly the worst in Europe. For this reason, when really fine asparagus is met with, people think it must be some peculiar sort—obtain the roots from Vienna, Berlin, Hamburgh, Battersea, or Deptford, and then, when they find them producing heads identical with what they had before, lay the blame to the seedsman, or the soil, or the climate, or any thing rather than their own want of skill. There is but one sort of asparagus, be its name what it may; all the difference consists in its cultivation.

Captain Churchill says the Guipuscoan asparagus measures from three to six and more inches in circumference. How this is obtained, his excellent account leaves no room to doubt.

Asparagus is a plant found naturally on the beach of various parts of the coast of Europe, where it is covered by the drifting sand, and watered by salt water at high tides. Sand and salt water occasionally may, therefore, be regarded as indispensable conditions for maintaining it in health. How seldom is this thought of! It, however, explains in part the excellence of St. Sebastian asparagus.

It seems that at the mouth of the Urumea is a narrow slip of land, about three feet above high-water mark, consisting of alluvial soil and the wearing away of sandstone hills, at whose foot it is placed. This is the asparagus ground of St. Sebastian. Beds are formed five feet wide, without any previous preparation except digging and raking. In March the seed is sown in two drills, about two inches deep, and 18 inches from the alleys, thus leaving a space of two feet between the drills. The rows run invariably E. and W.—doubtless in order that the plants may shade the ground during the heats of summer. When the seedlings are about six inches high, they are thinned to something more than a foot apart. Water is conducted once a day among the alleys and over the beds, so as to give the seedling an abundant and constant supply of fluid during the season of their growth. This is the cultivation during the first year.

The second year, in the month of March, the beds are covered with three or four inches of fresh night soil from the reservoirs of the town; it remains on them during the summer, and is lightly dug in during the succeeding autumn; the operation of irrigation being continued as during the

first season. This excessive stimulus, and the abundant room the plants have to grow in, must necessarily make them extremely vigorous, and prepare them for the production of gigantic sprouts.

In the third spring, the asparagus is fit to cut. Doubtless all its energies are developed by the digging in of the manure in the autumn of the second year; and when it does begin to sprout, it finds its roots in contact with a soil of inexhaustible fertility. Previously, however, to the cutting, each bed is covered in the course of March very lightly with dead leaves, to the depth of about eight inches; and the cutting does not commence till the plants peep through this covering, when it is carefully removed from the stems, in order that the finest only may be cut, which are rendered white by their leafy covering, and succulent by the excessive richness of the soil.

In the autumn of the third year, after the first cutting, the leaves are removed, and the beds again dressed with fresh night-soil as before; and these operations are repeated year after year. In addition to this, the beds are half under salt water annually at spring tides.

Let any one compare the mode of culture with ours, and there will be no room for wondering at the difference in the result. The Spaniards use a light sandy soil; we are content with any thing short of clay. They irrigate; we trust to our rainy climate. They know the value of salt water to a sea coast plant; we take no means to imitate nature in this respect. They dress their beds with the most powerful of all manures; we are contented with the black residuum of a cucumber frame, which is comparatively a *caput mortuum*. Finally, they throw leaves lightly over their beds, by which means they expose the young sprouts to the least amount of resistance, and force them onward by the warmth collected from the sun by such beds of leaves; we, on the other hand, compel the asparagus to struggle through solid earth, capable in the smallest possible degree of absorbing warmth during the day—but, on the other hand, ready to part with its heat again at night to the greatest possible amount.

Can any one wonder, then, at the poor results obtained by our manner of cultivation?—or that some gardener should now and then astonish his neighbors by producing asparagus which we call giant, but which at St. Sebastian would be called second rate?

THE ARTESIAN WELL OF GRENOBLE.

From the Mining Journal.

At Grenoble, in the vicinity of the French capital, it was considered advisable some years ago to endeavor to procure good water by means of an Artesian well. M. Mulot d'Epinay was the engineer to whom the task was entrusted. On the 31st of December, 1836, the bore had been carried, after immense labor, to the depth of 383 metres, (a metre is 3 feet and 2-10ths English.) The soil was a clay, very hard and compact. In the month of June, 1839, the bore had reached the depth of 466 metres, and the soil was still a bed of clay, though a variety of strata had been previously passed. M. Mulot kept a regular journal of observations relative to the soils and strata penetrated, and the temperature at different depths. This record will be valuable when published. At length, after a task of seven years one month and twenty-six days' duration, M. Mulot was rewarded by a degree of success proportioned to the time and trouble expended. Water was not only found, but found under such circumstances, and in such quantities, as will cause the well to be one of the most useful works as well as one of the greatest marvels of artistical ingenuity in France. The fluid burst out in a perfect torrent, rising to the surface of the bore to the amount of nearly three cubic metres in a minute, or 180 metres in an hour, and 4320 metres in the twenty-four hours. Such is the force with which it flows up the shaft, that it mounts more than thirty-two English feet above the surface of the ground. Mr. Hemery, director of roads and bridges, has calculated that the force of ascension of the water, at the bottom of the shaft, exceeds, by fifty times, the force with which water rises in a vacuated tube of thirty-three feet. The orifice of the well is fifty-five centimetres (about one foot eight inches) in diameter, and at the bottom it is eighteen centimetres in diameter. The shaft is in all 547 metres (or 1630 French feet) in depth, and the sides are strongly plated with iron to a depth of 539 metres. The dome of the Invalids, which has an elevation of 300 feet above the ground, is thus only about a fifth of the perpendicular measurement of the Artesian well of Grenoble.

Three times, during the operation, did the shaft give way, but the indefatigable engineer was not daunted, and at last he has had his reward. The water, which the well pours fourth incessantly, has converted one of the neighboring streets into a river, but the workmen are at present employed in forming a channel for its proper conveyance from the spot. As might be expected, the fluid was at first mixed with sand and earth, and continued to be so for some time. It is perfectly sweet, however, and had no odor of a disagreeable kind, or any other deteriorating qualities. It is of such a temperature, that there is an obvious smoke arising from it when it reaches the surface. This is a feature not likely to continue, and indeed easily removeable before use. The whole cost of this great work of art to the city of Paris is said to have been 160,000 francs. The perseverance in this labor for such a period of deferred success, is to be ascribed to the confidence resulting from modern geological discoveries; and the value of these is most splendidly shown by the success attained. By an ingenious contrivance, M. Mulot has been able to raise large quantities of sand from the bottom of the well; thus clearing the water more rapidly, and also adding very considerably to its force and volume. This removal of the sand has been attended with curious consequences in more respects than one. After ceasing, in a great measure, to throw up sand, the well has begun to throw up shells and petrifactions of various kinds, the debris of a former world. The success of the operations at Grenoble has also induced engineers to make similar attempts in other quarters. One is begun on a large scale at Vienna.

EXTRACTS FROM A REPORT TO THE STATE BOARD OF AGRICULTURE.

By Edmund F. Noel, of Essex county, Va.

ON LIVE-STOCK AND FRUITS.

The Virginia Board of Agriculture, at their first meeting in December last, agreed upon certain queries to be propounded to the most intelligent and experienced farmers and planters in the state, stating that no one individual would be expected to reply to all, but only such as he should best understand. As one of the circulars of the Board containing the queries has been addressed to me, I will proceed to cast in my mite, hoping others may do the same, and that much valuable and useful information may be obtained.

8th Division of queries.—Live-stock.

Our breed of cattle, with few exceptions, is mostly of the native breed. Mr. Coke, of Norfolk, England, sent to Messrs. Patterson and Caton, of Baltimore, some Devon cattle in 1817, and in 1825 I purchased a pair of calves of Mr. Caton at $250. I crossed them upon my cattle of the native breed. The cross I thought was superior to either breed. Many of the oxen lived and worked for me more than ten years, and performed well. Along with them the most of the time half Durham oxen worked: the cartmen were of opinion the half Devon oxen were much the best.

Durham cattle.—In 1828 I purchased of Col. J. H. Powel a Durham short-horn male calf, at $300, and crossed upon my cattle of the native breed. The cross was larger and finer than the Devon cross; but whether they were larger and finer in proportion to the food consumed, I do not know. The animal I bred from was probably superior to most of the Durham cattle. His sire and dam were imported from England by Col. Powel; and he bred from his sire, instead of other males imported by him. His dam, with twenty other Durham cattle, was exhibited at the Pennsylvania Agricultural Society the year before I got the calf, and by the society was pronounced second best. Col. Powel afterwards raised a male calf from her by the same sire, for his own use; which animal he afterwards sold to a gentleman in Kentucky, near Lexington, for $1000. I make this statement of facts so as not to mislead any person. An inferior animal of the Durham breed might have given a different result. I have had a chance of seeing a great many fine cattle in different parts of the United States; and, my life being entirely that of a farmer, I have taken much pleasure in looking at them. Many years past I saw the Devon cattle then in the neighborhood of Baltimore. Some years after I saw, near Philadelphia, Col. Powel's large stock of Durham cattle, a few days before his great cattle sale. Since which I have had a chance of seeing in Kentucky and Missouri a number of fine cattle of different breeds and crosses, but I have never seen finer oxen than I have seen in Mississippi, in the Choctaw purchase, of the native breed. I became a planter in that part of the state soon after its settlement, and I have spent many winters there. For some years after its settlement, nearly all the cotton was carried to market in ox-wagons, and during the time of delivery, it was nothing uncommon to see in a day several hundred oxen on the road leading to Manchester, (now Yazoo city,) and no person could behold them without admiring their size and beauty. Grass was then plenty, and they were fat the year round. The great error in lower Virginia is that of keeping an overstock of animals. Under such management no breed will be an improved breed long, nor an improved cross.

Sheep.—Our breed of sheep, like our breed of cattle, with few exceptions, is mostly of the native breed. Fine-wool sheep with us will not answer; we want coarse wool to manufacture in our families; and under our system fine wool is filled with trash, and will not do for market.

Bakewell sheep—called Bakewell after the fabricator of the breed, Dishley after his farm, and New Leicester after the part of the country in which he lives. This breed is hornless, white face and legs, wool long, just such as we want in our families for coarse fabrics; constitution tender; remarkably docile, more so than any sheep I have ever seen. For beautiful form and great propensity to fatten this breed is supposed to be unequalled. Numbers of this breed of sheep have been imported into the United States since our last war, and they have taken nearly all the premiums offered for coarse-wool sheep; lots of them have been slaughtered in our large towns to the north, averaging over twenty pounds of tallow per head, and small lots of them have averaged over thirty pounds per head. For a number of years I have had only half Bakewell sheep upon my farm, a cross on the native breed, with which I am very much pleased. But I have occasionally had a few pure Bakewell sheep, the cost of which $20 per head. But they did not appear to do as well as the half breed; they were more subject to disease, and not disposed to ramble over the farm as much in search of food. But where food is plenty, and they are well taken care of during the winter, I should suppose the pure breed greatly to be preferred.

Southdown sheep.—Hornless, speckled face and legs, wool short and fine, of a hardy constitution. Many years past I purchased two ewes of this breed, then with lamb, at $30 each. I was induced to make this purchase from the high character given to this breed of sheep, and particularly this family of them, by gentlemen in Philadelphia. See American Husbandman and the American Farmer, vol. 7, page 361. I am thus particular, lest it may be thought this family of Southdowns were not of the pure breed. I found them to be a hardy breed of sheep, with no greater propensity to fatten than the common sheep of our country, and their mutton no better; the quantity of wool very small, about what English writers state it to be in England, two and a half pounds per fleece. This breed of sheep proved the most unprofitable of any I ever had upon my farm.

Hogs.—Our hogs have been crossed by various breeds. I have myself purchased some from Connecticut, New York and Pennsylvania. Those I got from Pennsylvania I got of Mr. Barnitz. This breed was the best I ever had upon my farm; they were not of the breed described in the American Farmer, vol. 13, page 279, but a cross upon that breed, which he afterwards made. I cannot now lay my hand upon his letter, but, as well as I now recollect, he stated it to be a cross of the Chinese and Chichester breeds. Some years past

I got of Mr. Bement, of Albany, New York, a pair of Berkshire pigs. They did not come up to my expectation; their descendants were still worse; and, supposing they were in a state of degeneracy, from breeding in-and-in too closely, I determined to give them a cross, which was done with the following family of Berkshires.—(New York Cultivator, vol. 5, page 138.)

Berkshire pigs.—Messrs. Brentnall, of Canterbury, Orange, who have a stock of these pigs, from original importation, cite the following as the weights to which they have attained, at the ages noted: one, under two years old, weighed 652 lbs., one four years old, 702 lbs., one three years old 780 lbs., two eighteen months old 432 and 432½ lbs.," &c. The animals of this cross are now nearly grown, and are better than the Bement was, but nothing to justify what has been published in this country respecting the breed.

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13th Division of queries.—"Miscellaneous observations and statements of any thing of interest, not included in any query."

Under this division I will make some remarks on fruits, &c., without any arrangement of matter, and confine them to apples, pears, peaches and grapes. The number of different varieties of fruits now offered for sale in the United States is very great—of apples, pears, peaches and grapes, several hundred varieties. When such vast numbers are to be disposed of to inexperienced farmers, and scattered over the country, it is much to be regretted, there are but few which are of superior quality; and a few of these, judiciously selected, would supply the wants of a private family. Our apples and peaches are mostly of those kinds cultivated by our fathers, for the purpose of making spirits for market, which was common in those days. Our orchards at present have an unsightly appearance. The influence of the temperance society is very injurious to orchards. It is always on the ebb or flood; one year the caterpillars are suffered to eat up the orchard; another, the orchard is trimmed up and worked; one year the stills are pulled down; another, they are rebuilt, and the harvest gathered in with a shout. To avoid the too common error of the world, of telling others what they ought to do, and doing nothing themselves, I will tell what I have done, and the errors and difficulties I have had to encounter, that others may avoid them. In early life I purchased the plantation on which I now live. It had been held for a number of years as a life estate, and many parts tenanted out; and was just such a place as one would have expected to see. Some half a dozen apple trees, and a few old peach trees above the reach of cows, were nearly all the fruit trees upon the farm. Wishing a good orchard, I purchased 300 apple trees, of an individual in this part of the country, and planted them out. Shortly after which I purchased an excellent treatise on fruit trees, that had just been published, by Mr. Coxe of Burlington, New Jersey, with descriptions of the finest varieties of fruits, illustrated by cuts of two hundred varieties, of the natural size; and having moved from that part of the farm where I had planted the first orchard, to a more central one, I determined to plant another orchard, and to give the trees of the first one away. The second orchard was planted of the finest varieties of apples recommended by Coxe, and all the trees obtained from New York, with the exception of some few kinds we had in the neighborhood. At this time I had a farm some few miles from me, on which there was an apple orchard that had been in bearing a few years. I determined to graft it with some of the finest varieties I had just got from the north. For that purpose, I had about half of the large limbs cut off a little ways from the body, near the first fork of limbs. The other limbs were left to keep the trees alive, that part of the limb left that was off, that had water sprouts, was then grafted. And those that had no sprouts were left to throw them out, to be grafted the ensuing spring; the other large limbs left were the ensuing spring cut off and grafted in like manner. The grafts that lived, had a split or piece of bark tied around to know them; and as they grew, the water sprouts were trimmed to give room. The grafts inserted bore a little the second year, and in five years they bore a good deal, and the tops of the trees looked large and fine. But some of the trees were very much injured by cutting the large limbs too near the body; decay extended from the cut through the limbs to the body. Limbs, in proportion to their size, should be cut farther from the body, large limbs several feet, and tar should be rubbed on the end of the limbs. It in a great degree prevents decay, but too much is an injury; it runs down on the bark in hot weather and scalds the bark. After the trees had come to bear a few years, I found most of the varieties did not suit this part of the country, and had to regraft nearly all my young orchard, one half of which was planted of the green Newtown pippin. This has long been considered the finest winter apple known. It bore well with me, but about the time of ripening nearly all would speck and rot on the tree. Some of the other kinds were no better. The following kinds I prefer; they have been bearing with me for many years; I will name them in the order they ripen. June-eating, Prince's harvest, a small yellow apple, summer pearmain, yellow bellflower, and Carthouse.

June-eating.—This is the earliest apple of our country: size small, form flat, color yellow, flavor pleasant, the skin of an oily feel.

Prince's harvest.—About two or three times as large as the June-eating, and something of the same form and color; fine to cook, but not good much in other respects.

A small yellow apple.—A seedling of this neighborhood, the size of a common crab apple; the form flat, flesh remarkably tender, rich and of delightful flavor, and an excellent fruit to cook. It bears only every other year, then abundantly; it ripens slowly. It is to be regretted that such an excellent apple should be so small, and to bear only every other year.

Summer pearmain. This is one of the very finest summer apples of our country; the size large, with us much larger than the cut in Coxe's Treatise on Fruit Trees. The color a reddish yellow, with streaks and spots of deep red; juicy until too ripe; the flesh very tender. It frequently cracks open on the tree and bursts from its own weight in falling. It is a fine apple to eat or to cook; it is free from rotting; ripens slowly

and lasts for a long time; it bears every year, but has its full and scanty years of bearing.

Yellow bellflower.—At a little distance from this apple, it has the appearance in size, form and color of the common quince of our country. It is an excellent apple to eat, or to cook; the flesh is rich, juicy and tender. It bears every year, and is one of the most productive apples of our country. The tree grows large and spreading, with pale leaves and hanging boughs. There is another apple, that should not be mistaken for this—the monstrous bellflower, a worthless apple, with fruit in appearance resembling the yellow bellflower. The difference in the growth of the trees is easily told; the monstrous bellflower has upright limbs, with very large foliage of a deep green. Some varieties of apples seem adapted to particular localities, whilst others seem to retain their excellence over a much greater extent of country: this appears to be the case with the yellow bellflower. It is represented by Coxe as "the most popular apple in the Philadelphia market;" and in the New American Gardener, published at Boston, a writer says, "This apple we can decidedly recommend from twenty years trial; it is a great bearer." But I do not think it as large here or as fine as I have seen it to the north; probably it would not do to cultivate much further south. This apple is considered a native of New Jersey.

Carthouse.—This I prefer as a winter apple to any other I have ever had under cultivation; it is an excellent apple, very productive, and bears every year. The following is Coxe's description of it: "This apple is said to have been brought from Virginia; it obtained its name from a family in the Delaware state. It is highly esteemed for its excellence as a table apple late in the spring, and as a good cider fruit. It is a most abundant bearer, and hangs on the tree very late in the season. The tree is hardy, of a handsome, open, spreading and vigorous growth. The fruit is small, the color a deep red, sometimes a little streaked with yellow; the skin of a polished smoothness; the form inclining to an oblong; the flesh is very firm, yellow, and rich, not fit for eating until mid-winter, when it becomes juicy, tender, and finely flavored." Coxe says this apple is small, but the cut he gives is over the common size with us; it may be said to be an apple of the common size, except when the trees are over full. The Carthouse, when gathered with us, are put in barrels or boxes in the cellar without any thing with them; in this way they keep until they are used. A cool dry cellar is the best place to keep apples, in fact they cannot well be kept any where else, without soon becoming dry and tough. I have read much that has been published on fruits, and I have taken much interest in this matter, and having frequently to pass from here to Mississippi, by the way of Baltimore, Cincinnati and Louisville, I have frequently gone to market, and to the fruit shops to examine the fruits, and from what I have seen, and trials I have made with many varieties, I have come to the conclusion, that were I to cultivate only three varieties of apples in this part of the country, I should cultivate the summer pearmain, yellow bellflower, and the Carthouse. These three varieties would give a succession of fine fruit from some time in August, until the ensuing spring, and would be more apt to bear annually than most other varieties. To persons wishing to cultivate a greater variety of apples than I have named, and who may be inexperienced in such matters, I would recommend the following varieties for trial: red June-eating, summer green, Roane's crab, wine apple, James river, black coal, and Gravestein. Red June-eating is said to be a fine early apple; with me it has not yet borne.

Summer queen.—This is represented by Coxe and others as very fine. I was under the impression, for some years, this variety was in my orchard, but it proved otherwise. I have since obtained a tree from the north for this variety, but as yet it has not borne. It is said to be a large apple, yellow color, with stripes and clouds of red, and "equally suited for eating and stewing."

Roane's crab.—Coxe states this apple to be a native of this state; that it originated on the farm of an individual whose name its bears. He says "it is an early and a great bearer every second year; the apple is small," "the form is round, the stalk thin, the skin yellow, with a small portion of russet about the stem, and spots of red scattered over it." "The liquor is remarkably strong, of a sirupy consistence when first made, but becoming singularly bright by proper fermentation and racking. It will keep perfectly sweet in casks well bunged, and placed in a cool cellar, through our summer months." I have frequently eaten this apple; it is only tolerable. Many years past I occasionally had a chance of drinking some of the cider; I thought it the best I had ever tasted. Persons wishing to raise cider of a superior quality should give this apple a trial.

Wine apple.—This is a very fine fall and winter fruit, and has succeeded in this neighborhood very well. The fruit is large, form flat, color red, streaked and spotted with small portions of yellow; the stalk end frequently of a russet color. The tree grows large, leaves small. This kind should not be mistaken for the winesap.

James river.—I know nothing of this variety; but I have seen it highly recommended as a winter apple.

Black coal.—A large red winter apple; this with me has not yet borne.

Gravestein.—A small winter apple. The two last varieties named, were introduced into this country a few years past, and are represented as very fine north of us; but experience must prove whether they are adapted to our part of the country.

Pears.—In early life I have purchased many varieties of pear trees, from the finest northern nurseries. I was then under the impression, it was like writing to a neighbor for a bushel of corn or wheat—what was written for would be received; but in this I was greatly mistaken. But for this, I could say much more on pears than I now can say. From what I have seen, and from what has been published, I should consider the following varieties the finest: green chisel, or Madeline, early Catherine and English Gargonelle, or summer bell. These are said to ripen before the peach. Seckle, a summer pear; yellow butter or St. Michael, a fall pear; Echasserie, a winter pear.

Green chisel, or *Madeline.*—I raised four trees of this variety, which bore with me for several years, but the blight which is so destructive to the pear trees of our country killed them all. This variety of the pear, I think, will not succeed well as far south as this.

Early Catharine.—I purchased a tree for this kind many years past, but when it came to bear it proved to be the green Catharine. I have since purchased another for the early Catharine, which has not yet borne with me. Coxe says, "this is more generally admired than any summer pear; it is remarkably fine, rich, waxy and luscious. Its form somewhat like a calabash, with a long curve neck, and a long fleshy stem; the skin is on one side yellow, the other a rich russet or brownish-red." Coxe's cut of this pear, exclusive of stem, is 2¼ inches in length, its greatest breadth 1⅜ of an inch, which is about ¾ inch from the blossom end.

English gargonelle, or *summer bell.* This variety has not borne with me as yet. Coxe says, "it is a tolerably large pear," "with a neck somewhat curved, and diminishing to a small point, with a long stalk, fleshy towards its junction with the fruit, the skin is a light green, with small cloudy spots, blended with russet, particularly near the stem, the cheek next to the sun has frequently a brownish-red color." Coxe's cut of this is about 2⅜ inches in length, its greatest breadth 1¾ of an inch, which is about one inch from the blossom end.

Seckle.—This is considered the finest pear known, and is supposed to have originated in the vicinity of Philadelphia, and is called after the name of the individual on whose farm it is supposed to have originated. Coxe says, "the form and appearance vary with aspect, age and cultivation, the size generally is small, the form regular, round at the blossom end, diminishing with a gentle swell towards the stem, which is rather short and thick; the skin is sometimes yellow, with a bright red check, and smooth, at other times a perfect russet, without any blush." "The tree is singularly vigorous and beautiful, of great regularity of growth and richness of foliage; very hardy, and possessing all the characteristics of a new variety." Cox's cut of this is about 2⅜ inches in length, its greatest breadth 2¼ inches, which is about an inch from the blossom end. I have two trees of this variety that have been in bearing for some years; they have been very healthy and productive, and not injured in the least by the blight. But with this pear there is a drawback that I have not seen noticed by any writer. About the time of ripening, storms beat down great numbers of them; they generally have broken stems; probably the limbs, which grow close and thick, are forced with too much violence against them; the stems may also be more brittle than usual. As they fall so they remain, never becoming any riper.

Yellow butter and St. Michael.—This is considered in excellence next to the Seckle, and a much larger pear, though Coxe has given cuts about the same size. However, this error may be considered corrected, as he calls it a large pear. This pear is said to be better when gathered before it is ripe and housed. I cannot say how this is, but I have eaten some very fine ones that storms had beaten down several weeks before the time of ripening, that had been housed. It is said to be "a never-failing and abundant bearer, and produces fruit at an early age. The tree is of small size." I had two trees of this kind, that bore with me for several years, but lost them both by the blight. I think it probable trimming caused their death. "From the great vigor and rapidity of the vegetation in America, pear trees, if much pruned, are apt to grow too fast. This appears to render them more liable to the effects of the fire blight than otherwise they would be."

Echasserie.—This pear has been extensively cultivated in our country for a great number of years, and is represented as an excellent pear, hardy, very productive, and bearing abundantly at a very early age; it is rather a small pear. Years past I purchased a tree, for this kind, but it proved otherwise. I have now some few trees grafted from a tree of this kind, owned by an acquaintance of mine, who is very much pleased with it. Mr. Prince says, Coxe erroneously calls it the ambrette. Coxe says the ambrette, "when ripe, is green; the skin rough with small russet spots, and some black clouds. Neither the crown nor stalk end is indented. The flesh is rich, juicy, and highly flavored." Coxe's cut of the ambrette is 2⅜ inches in length, its greatest breadth nearly 2¼ inches, which is near the middle. I have been more particular in the description of pears than I should otherwise have been, in consequence of their being very subject to the blight, for the pear-tree cannot be regrafted, like the apple, without running a great risk of losing the stock by the blight. I have planted out a good many quince stocks where they are to stand, and recently grafted the Catharine and Gargonelle to them, a little below the ground. Coxe says the pear "will take on the quince either by inoculation or ingrafting. The former mode performed above ground will produce dwarf trees; the latter mode, under ground, in the root, will in some varieties improve the pear; in all it will form a strong vigorous tree." The quince is much used for ingrafting summer tender pears, and for espaliers; they do not suit winter pears so well, as they are apt to crack." Another author says, the pear ingrafted on the quince "has the property of giving to the fruit it bears greater precocity, an increased size and improved flavor, but with this drawback, that the quantity is small, and product short-lived, as the age of the tree seldom exceeds ten or twelve years."

Peaches.—The first peach orchard I ever planted was made up of the finest varieties I could obtain in the neighborhood. The site was fixed on, and the holes dug, four feet deep and four feet wide, and filled up with two ox-loads of rich earth, mostly from the adjoining woods; the other earth used was rich earth from under some old peach trees. This earth was used after I left home in the morning, under the impression it was richer than the other. On my return home I found what had been done, and anticipated the result. I had read enough to know that the site of an old orchard was not a proper place for a new one of the same kind; and in this case I thought it would be much worse, as the earth was put in the very holes in which the trees were to stand. However, as I was not very partial to the site, I determined to plant the trees, and see the result. The trees were planted, and in a few days there came a heavy rain, and the earth in the holes sank very much, though it had been partially trodden. The trees sank so low, and were so much thrown out of a line, they had to be pulled up and replanted, and before the ensuing year a good many died, others looked sickly, and some were quite flourish-

ing. Wishing to have nothing more to do with this site, for an orchard, I had the trees pulled up, and thrown away, and determined to plant another of the finest varieties known in our country, at least as far as I could get information on the subject, to enable me to make the selection. I found it necessary to read the best treatises I could get on fruit trees; and in 1824, I ordered a good many varieties from a large nursery in New York, and in 1826, I ordered 100 trees of 17 varieties, mostly 7 trees of each variety, from a large nursery in New Jersey. With these I planted another orchard, and looked forward with pleasure to the result. But after it had borne a few years, I found it was more in want of an axe or a grubbing hoe than any thing else—there were so many unprofitable varieties: since which I have used the axe and hoe freely. Some of our largest and finest peaches are amongst the most unprofitable to cultivate. Within the last two years, I have brought under cultivation nearly all the first-rate peaches known in our books and catalogues, that I had not tried before, with a view of making out a fine and profitable succession, the season through. Of these varieties I cannot now say any thing, but of those varieties that I have long had under cultivation, I prefer the following:

Red Magdalen and *red rare-ripe* are very fine early peaches.

Oldmixon cling-stone (sometimes called red Catharine) is a large peach with a red cheek, and is one of the very finest peaches of our country, and one of the most productive. It ripens immediarely after the two just named. This variety is said to be cultivated in the vicinity of our large towns to the north, to supply the market. About two years ago, while in Baltimore, I had some conversation with a gentleman who owns a large nursery near town. He stated to me he had an acquaintance, who had supplied the Baltimore market with peaches on a large scale, for the last thirty years, and he told him he considered the Oldmixon cling-stone the most valuable peach he had.

Oldmixon free-stone.—A fine peach. It resembles the Oldmixon cling-stone in its external appearance, and ripens about the same time; but in other respects is not to equal it. I am rather inclined to think another peach can be substituted for this in a succession of peaches for this part of the country; however, as yet, I have been compelled to retain it.

Columbia, in catalogues of fruit trees called Columbia superb. A large free-stone peach of uncommon excellence. The skin yellow, covered with stripes of red, giving it a singular and handsome appearance. It begins to ripen about the time the Oldmixons are about half gone. This peach is too much disposed to rot about the time of ripening to be cultivated on a large scale, but, as yet, I have been compelled to retain it, but hope yet to get a more profitable one to supply its place. One tree of this kind, in a garden or yard, is desirable on account of its excellent and beautiful appearance.

Common Heath.—This, like the Oldmixon cling-stone, is one of the most valuable peaches of our country; the color white, and the form oblong. It ripens in the fall, and is considered the finest to dry, or to preserve in sugar or in brandy.

A few years past, I had 300 bundles of peach stones put up and distributed gratuitously through this and the adjoining counties. Each bundle contained twenty-five stones of the six varieties just described.

Grapes.—I have had about thirty varieties under cultivation, of the native and foreign varieties that have been most highly recommended by the best writers of our country on the vine. The five following varieties seem most generally recommended, notwithstanding they are objectionable in many respects, the last three of which I have only recently brought under cultivation—Isabella, Catawba, Herbemont's Georgia, Hyde's Eliza, and Lenoir.

Isabella.—The fruit is of a dark purple, of a large size, and oval form, with a pulp; supposed to be the most productive grape ever known in our country. It is supposed to be a native of South Carolina. I have had this variety in my garden for about twenty years, and for a number of years I was greatly pleased with it; but for some years this grape has been nearly destroyed by the mildew, throughout our country, with the exception of our large towns, and even in them it is said now to suffer much from the mildew.

Catawba.—This is a large grape, of a lilac or bluish color, covered with a beautiful bloom, which gives to it a bluish-purple appearance. The bunches are large and uncommonly beautiful. The foliage and berries resemble the red Bland (a native, erroneously called blue English) more than any variety that I have had under cultivation. As a table grape it is only tolerable; but is said to be one of our finest wine grapes. This variety I have had in my garden as long as I have had the Isabella. It is more subject to rot than formerly; but not as much so as the Isabella. It is supposed to be a native of Maryland.

Herbemont's Georgia.—The name of this variety has been recently changed by Mr. Prince, of New York, from Herbemont's Madeira, under the impression it is a native grape of Georgia, and is now so classed in his catalogue of native grapes. Mr. Herbemont and others who have written much in favor of this grape state it is rather too much subject to rot in wet seasons; but, notwithstanding, its cultivation is highly recommended, and it is now one of the most popular grapes of our country. Mr. Prince, in his Treatise on the Vine, says, "This is an excellent grape, either for the table or for wine; the latter has been sold in South Carolina, for two dollars per gallon before it was five months old. The vine is vigorous and an abundant bearer; it is remarkable on account of the young branches having white spots on them, as if a white pellicle had been partly peeled off." Mr. McCall of Georgia, one of the most successful cultivators of the vine in our country, represents the foliage of this variety of a light green color, the juice of the grape as white, the wine becoming of an amber color, of an exquisite nut flavor; the berries round, of moderate size, and nearly black, set pretty close on the bunches, and weighing about five ounces each.

Hyde's Eliza.—This variety I have been induced to give a trial from the recommendation of Mr. Prince, who thinks it one of our first native varieties. It was but little known when Mr. Prince published his Treatise on the Vine, but from it I will make an extract: "It is a flourishing vine, the fruit is of a medium size, blue when ripe, very

sweet, and has no hard pulp." He states it to be a native of New York of recent origin, that it came up in the garden of a Mr. Hyde, and that Mr. Hyde said he called it "the Eliza, because it was reared and nurtured by a beloved daughter."

Lenoir.—The vine is represented of vigorous growth; the fruit small and black, of a superior quality to ripen early and never to rot. It is not a great bearer; but notwithstanding it should be given a fair trial. It is highly recommended. It is supposed to have originated from the seed of a foreign variety in South Carolina, upon the farm of a person whose name it bears, and is classed with foreign grapes.

I have been as particular as I could, in giving a description of the fruits recommended, so as to enable the cultivator to know them. In conclusion, to save trouble, I will state, I keep no stock for sale of any kind; and as to fruit trees and vines I have none for sale, nor have I ever sold one. Yours, respectfully,

EDMUND F. NOEL.

Edmund Ruffin, esq.,
Cor. Sec. Board of Agriculture of Virginia.

EXTRACTS FROM THE ANNIVERSARY ORATION OF THE AGRICULTURAL SOCIETY OF SOUTH CAROLINA. BY GEN. JAMES H. HAMMOND.

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The extraordinary progress of the growth of cotton has, it is well known, occasioned a series of calculations, at various periods, from the time of the invention of the saw-gin, to prove that it must soon shoot far ahead of the consumption, and that competition would in a short time confine its culture to a few favored spots. Contrary, however, to all reasonable expectation, consumption has advanced with the same wonderful pace as production; and relying on the frequent failure of past predictions, many are even yet sanguine that it will continue to do so for a long period to come. I very much fear that they are at last mistaken—that what has been prophecy for such a time, is shortly to be fact; and that the present depression of the cotton market is neither accidental nor temporary, but the result of natural causes, and likely to be permanent.

The rapid increase of consumption has been owing to causes which can be explained, and to which limits may be assigned. A spirit of improvement in machinery for manufacturing it had sprung up in England, some twenty years before cotton began to be cultivated in this country. The hand-frame, cylinder cards, woof and warp machine, spinning jenney, and power loom, followed each other in quick succession, and Watt soon taught the whole to move by steam. The quality of goods was in consequence very much improved, and prices also reduced, so as to recommend them at once to all classes of consumers. The raw material then furnished, as might be supposed, fell far short of the augmented demand, and production was in turn vastly stimulated. The supply increased from America with great rapidity after Whitney's gin came into general use, but new inventions in machinery continued, and as even the home market had not yet been overflowed, and the demand still kept ahead of it, until the general pacification of Europe and the world opened fresh markets to this new style of goods, which could never apparently be stocked. Peace, also, made money abundant. New and immense investments were made in manufactories, and cotton mills arose all over England. It was of no small consequence to the result that England was the seat of this great manufacturing revolution. Her incalculable wealth, her great naval, superiority, and her vast territorial possessions, scattered over every quarter of the globe, gave her the command of a commerce unknown before in the annals of the world. And during a period of profound peace, longer than mankind have enjoyed since the death of the elder Antonine—and happily not yet terminated—this great nation has devoted herself to almost the sole purpose of opening new markets and filling them with cotton goods. To all these circumstances is owing the rapid stride of consumption, which has thus far out-stripped all calculation. But these causes have run their cycle; their utmost effects have been fully felt; all the markets now accessible to cotton manufactures are kept not only stocked but glutted; and although peace should continue and improvements in machinery go on, and the power of England still remain unbroken, none of which, to say the least, are certain, it is impossible for consumption to increase in any thing like the ratio it has hitherto done.

That it will increase to some extent, in every given series of years, is perhaps certain. I believe that cotton goods must undoubtedly drive linen from the almost entire monopoly which it yet enjoys in the domestic uses of the continent; that they have, sooner or later, to clothe the naked barbarians of Africa, as well as the silk-robed myriads of the Chinese empire: to ascend the Euphrates; to break more effectually through the barriers of the Bosphorus, and penetrate to all the nations of the Black Sea, the Volga and the Obe; while every birth in a large portion of the old world, and in the remotest civilized corner of the new, creates a fresh demand. But all this must be the work of time. Popular prejudices must be broken down; the policy and the agriculture of nations now devoted to growing rival commodities must be revolutionized, and manufactures must spring up and gain the ascendency where poverty and ignorance and despotism now flourish. Years, perhaps centuries, must elapse before all this can be accomplished; and peace and commerce must, for all the time, hold the world subject to their benignant influence.

It might be thought that the great increase in the sales of raw cotton during the last year (1840) argues an equal increase of consumption. But it must be remembered that the sales of 1838 were nearly equal to those of the last: that this year they have again fallen off to a fearful degree, receding to a point below those of 1839, and not much in advance of those of 1837, and that in spite of the greatest falling off in the crop ever known in one year, there has been an actual increase of the surplus on hand in Liverpool and Havre. The large sales of the last year were in fact owing to the great fall of prices, and the reduced sales of this year, to the trifling increase of them in the early part of the season, thus showing, that in the present state of the markets,

the smallest advance instantly checks consumption, which would not be the case, if the supply had not, to say the least, fully reached the limits of the immediate demand. The disastrous condition of the manufacturers during the present year, proves also, that the purchases of the last, even by the trade, were speculative, and did not indicate the true ratio of consumption. Indeed it is now generally conceded, that ever since 1834, notwithstanding the great appearance of manufacturing prosperity, more goods have been turned off than were required for consumption, and have accumulated all over the world, to an extent not so easily perceived, but not less fatal in effect than the accumulation of the raw material in the great markets of England and France.

But while consumption is thus fluctuating—giving the clearest evidence that it has approached a point beyond which it cannot advance, except with the slow march of time and the mighty changes to which I have alluded, production is not only going forward with gigantic step, but yearly developing a capacity which proves that it has yet scarcely passed its infancy, and has been creeping lazily along, compared with what it can do. If we are to believe the English, the experiment of growing improved cotton in their Indian possessions, under the direction of Americans—from our seed, and prepared with our gins, is likely to succeed. Already has some of the new made cotton been sold in Liverpool at a price higher than that of our best New Orlean's brands. I do not, however, feel very deep apprehensions from this quarter. The sample sent was probably most of it from the little Isle of Bourbon, where the finest Sea Island cotton, next to our own, is known to grow. With a soil impoverished by 2000 years or more of cultivation; with a climate in which it rains continually for half the year, and for the remainder of it never rains, so that during one period cotton will not grow at all, and during the other must depend on dews and laborious irrigation; almost without animal power; with an idle and feeble race of laborers; paralyzed by absurd social forms; and subjected to the most unprofitable as well as the most wretched system of slavery; with all these drawbacks, I cannot believe that India will be able to compete with us. It is idle to talk of her doing so with other sections of our country. To Egypt—notwithstanding the temporary effect of the galvanic energies of Mehemet Ali—and to Western Asia, belong nearly all the disadvantages of India, without the benefit of English capital and English enterprise. Brazil and other parts of South America might become more formidable rivals, but their institutions are too unsettled, and their population too motley and uncivilized, if they had no other impediments, to give us serious alarm.

But the cotton growers of South Carolina need not look abroad for competition. It is much nearer home. It is our own kith and kin—the hardy and industrious and enterprising vanguard of civilization—that have levelled the gigantic forests of the south and southwest, and furrowed the rich bottoms through which pour the tributaries of the Gulf of Mexico, from the Suwanee to the Sabine, and that have but recently rescued from a slothful race the fertile empire stretching beyond the Sabine to the Rio Grande—who are destined at no distant day, to supply the foreign markets of the world with this inestimable staple. They have just overcome all the incipient difficulties of the enterprise, and are now prepared to put forth, on the finest soil and in the most favorable climate of the earth, an energy which must inevitably crush all serious competition.

A few facts will show their progress and our own. From 1789 to 1811, the production of cotton in the United States had increased from nothing to 90 millions of pounds, of which but 2 millions were grown in the gulf states, not counting Georgia and Tennessee among them. By 1826, these states had risen by slow degrees to 135 millions in a crop of 368. In 1834, the whole crop had increased to 457 millions, of which they produced 252 millions, or rather more than half. And in 1839, when the crop amounted to 830 millions, the same states grew 600 millions, having in the last five years doubled their production and made 100 millions more, while the rest of the cotton growing states in the aggregate had actually, for thirteen years previous, made no increase at all. The world is accustomed, especially of late, to speak with astonishment of the unparalleled progress of the growth of cotton in this country. Yet for fifteen years now the whole of that progress has been made in the gulf states. Notwithstanding the high prices, we have been stationary. Is not this a startling fact? It seems to me of itself to settle the question, and to leave no doubt that these states, having now but fairly prepared themselves for it, so soon as the check on consumption shall place in strict competition all the cotton growers of the world, and reduce prices to their lowest point, the cultivation of this staple must be confined almost entirely to these fertile regions.

Now, I believe, prices have already reached, if indeed they have not gone below, the lowest point at which we can profitably grow cotton in this state. The average amount of cotton made in South Carolina, and I may include a large part of Georgia also, does not exceed 1200 lbs. per hand. The average expenses per hand cannot be less than $35. When every thing is taken into account for which money is paid or labor abstracted from the field to make, I doubt whether the most judicious planter is able to reduce them lower. If, then, cotton sells at an average of 10 cents net, on the plantation, to do which it must bring in the seaports 11 or 12 according to the distance of transportation, the clear profits for each hand in these states will be $85. And this includes the rent of land. If cotton sells at 8 cents net, on the plantation, the clear profit, rent included, will be only $61. If this estimate be correct, it will be seen at once that cotton cannot be profitably grown here at 8 cents per lb. Yet this is at least as much as we shall realize for the present crop, and more, I believe, than we can safely anticipate hereafter.

If any one doubts the permanency or abundance of the future supply from other quarters at 8 cents per lb. or even less, let him look a moment at the profits of the planters in the gulf states to which I have alluded. The vast land speculations incident to new and fertile countries, and the fact that every thing has been conducted there on the credit system, have, it is true, involved those states in great embarrassment. But this does not affect the productive capacity of the soil. The average crop per hand there cannot be

rated at less than 2000 lbs. The expenses per hand I will estimate at $40, although when compelled to be economical, I see no reason why they should exceed our own. At 10 cents net, for his cotton, the gulf planter will make $160, clear, against $85 at the same prices here, and at 8 cents, $120 against $61; which shows that, at prices ruinous to us, he will realize a handsome interest on his investment. But while I have estimated our production fully as high as truth will permit, I am satisfied I have underrated that of some of these states, perhaps all. On their best lands 300 lbs. per hand is not at all an extraordinary crop, and more is often made. The planters themselves, though great advocates of short crops at certain seasons of the year, would scarcely be willing to estimate their average crops at less than 2500 lbs. At these rates of production, and even 6 cents a pound net, they will make the very fair profit of $110 to 140 per hand; and unless cotton is for ever to baffle all the laws of trade, it is certain that prices must ere long range about and possibly below that point.

A result so fatal to us could only be arrested by the want of sufficient land or labor in these fruitful countries. But of this there is no prospect. Both may be already found or soon placed there in ample abundance, to supply not only the whole quota furnished by the United States, but all that is now furnished by every cotton growing region, for the foreign markets of the world. A slight examination will show the fact conclusively. The crop of the world for 1839, the last of which I have seen a full return, and the largest perhaps ever grown, supplied the markets of the United States and Europe with a little less than 1000 millions of pounds. At the rate of 250 lbs. to the acre, it would require but 4 millions of acres to grow it all. The four states bordering on the gulf—Louisiana, Mississippi, Alabama and Florida—not to include that almost equally fertile section of Georgia between the Flint and Chattahoochie rivers—contain 130 millions of acres. If then only one acre can be found in 32 capable of producing 250 lbs. they alone can supply the present demand of all the foreign markets of the world, and of our own also. It is difficult to compute the entire crop of the whole world, including that portion which is consumed at home in other countries than our own, as well as that which goes abroad, but according to the most extravagant estimate which has been made—excepting however the very veracious returns of our late census takers—it cannot exceed 1500 millions of lbs. At the rate per acre mentioned, it would require but 6 millions of acres, or one in 21 of those contained in these states, to yield the whole amount, and supply the entire demand not only of the foreign markets, but of the whole human family at the present moment.

In this estimate I have said nothing of the magnificent wilderness which joins us on our south-western border. Texas alone contains 150 millions acres. The climate has not been fairly tested, and like that of other regions approaching the tropics, its vicissitudes may prove too great for complete success in the cultivation of cotton. As yet, however, those best acquainted with it regard it as the most favorable of all others, while a large proportion of its soil is undoubtedly as fertile as any which has ever yielded its fruits to the hand of man. Already it is swarming with the adventurous offspring of the great Anglo-Saxon family, and offering the most formidable competition to even the bountiful bottoms of the Mississippi and Red River. When sufficient labor shall have found its way thither, as it is now rapidly doing, no one can venture to assign a limit to either the extent or cheapness of its production of cotton. There is little question, however, that out of the 280 millions of acres, embraced in this country and our own gulf states, land enough will be found in considerable bodies of such quality as to grow, at 6 cents a pound, or less, cotton sufficient to supply the progressive demand of mankind in all time to come. For were they at this moment to be civilized by some supernatural influence, with every avenue of commerce thrown wide open, and every article competing with it drawn from the market to the full extent that probably they ever can be, the 800 millions who inhabit all the earth would scarcely require more; 8,000 millions of pounds. This they might produce on 30 millions of acres, or 1 acre in 9. And when it is remembered that one half of France and one third of England, barren as they were by nature, are now in actual tillage, it cannot be extravagant to suppose one ninth of these prolific soils well adapted to the growth of cotton.

Nor will there be any deficiency of laborers. White labor, it is true, can be made available only to a very limited extent. But there are in the United States and Texas upwards of two millions and a half of slaves, 1,500,000 of whom may be rated as efficient hands. Those who grow cotton make their own provisions, or can do it. To meet the remaining agricultural and domestic, as well as all other demands for slave labor, will scarcely require more than half these hands. So that the other half, or 750,000, may be employed in cotton culture. These, at even 2000 lbs. each, will produce 1500 millions of pounds, which is precisely the amount at which I have computed the crop of the whole world. But the present demand of all the foreign markets and our own can be supplied by 500,000 properly located; and there is little question that such a location will be speedily effected. This done, we shall have an actual surplus of slave labor on our hands.

If, then, the consumption of short staple cotton has reached such a point that the least advance on the present low prices immediately checks it, and one at which it seems scarcely possible, at any prices, to maintain it, if at the same time the production of this kind of cotton is increasing every where over the world, and especially in the countries bordering on the Gulf of Mexico, both in and out of the United States, who, though latest to begin its culture, possess such advantages of soil and climate as to have already far outrun all competition, and, having conquered most of the difficulties incident to new countries and new enterprises, do now furnish six-tenths of the demand of both the American and European markets, and are capable of supplying, almost immediately, the whole, at such prices as are utterly ruinous to us, if all these things be true, as I have endeavored to show they are, the conclusion is irresistible, that the planters of South Carolina will be speedily compelled almost if not altogether to abandon its longer cultivation."

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"Deprived of cotton as our main crop, we shall be compelled to resort to every variety of production which our soil and climate affords, to make out a crop which may be profitably cultivated. Among them I have no doubt that cotton will always hold a place to some, though probably a small, extent. I have estimated the average production of the best cotton regions at 250 lbs. per acre. And although they have much that will do better, I think I may safely say, that land which will produce 300 lbs. need not fear any competition. We have no bodies of such land in our state. But here and there spots may be found, and by judicious management more can be made to do it. So that every planter who will be content to lessen materially his cotton crop, and commence at once to manure highly all he plants, may yet be enabled to grow some of his favorite article. For the bulk of his crop, however, he must adopt some of the substitutes I shall enumerate.

In all that I have heretofore said, I have spoken of short staple cotton exclusively. It is well known, however, that South Carolina is the largest producer of the best Sea Island cotton. In its finest qualities we have, I believe, as yet no rival. How far this crop may be profitably extended is uncertain. The consumption of it has fluctuated around the same point for the last thirty years, and we might infer had reached its maximum. But by a judicious system of culture, there is reason to believe that the inferior qualities—the Maines and Santees—may be grown so cheaply as to drive out of competition the Egyptian and better sorts of Brazilian which now rival them, and thus secure a larger market for ourselves. Our planters on the sea-coast already put in little enough to the hand, and are alive to the advantages of manuring. Let me recommend to their earnest consideration a much more extensive use of that implement which has wrought such a revolution in short staple culture within the last 10 years. I mean the plough. Horse power is in planting what machinery is in manufacturing. And it not only saves labor, but does better work and assists to preserve and renovate the land. Cato said—so long ago as his day—that "the best culture of land was good ploughing: the next best, ploughing in the ordinary way, and the next best"—but after these, "laying on manure." I commend his maxims to our Sea Island planters, and believe that by the adoption of them they will soon absorb a portion of the labor which will be thrown out of the short staple crop.

The culture of rice upon sea-board has stood the test of time and competition, and we may safely regard it as a great and valuable staple, of which no contingency is likely ever to deprive our state. The demand is steadily increasing, and offers a fair reward to those who will embark in its production. Although we grow three-fourths of the crop of the United States, only a small part of the state adapted to it has yet been prepared for cultivation. Vast inland swamps well suited for it, yet frown in barren gloom every where below the ridge, while many of our up country bottoms, which are destined at some future day to groan beneath its harvest, are now idle wastes, consigned to flags and rushes. The necessity which shall drive us to drain these grand reservoirs of disease and death, will one day be hailed as an inestimable blessing. We cannot too soon turn our attention to it, and instead of drawing our supplies of rice from the sea-board, we of the up-country may at no distant day send our tributes to unite with theirs in supplying the north, and western Europe, where this luxury is fast becoming a necessary of life."

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"The innumerable streams which intersect the state, and the gradual fall towards the ocean of even the flattest parts of the low country, afford great advantages for draining, while nature has been extremely bountiful to us in materials for manure. In many parts of the state marl has been found in abundance, and at convenient points for water transportation: and no doubt it will yet be found where it is not thought of now. In other parts limestone exists to an unknown extent; and in others again salt-marsh and oyster-banks abound. Almost every where upon our rivers, creeks, and branches, and in our swamps, we have rich alluvial deposites, a portion of which may be well spared to recruit the exhausted soil near: and our forests furnish a boundless supply of leaves and straw, which in various ways may be converted into valuable compost. Possessed with these resources, and all the usual ones incident to farm yards, whenever we resolve to set seriously about it, I question whether it will be found near so tedious or expensive to reclaim our waste and renovate our worn out lands, as is now generally supposed. But this interesting topic alone would require all the time allotted to this occasion, and I must therefore pass from it to continue my enumeration of the substitutes to which we may resort when we can no longer depend upon our cotton crops.

"Although we now purchase from other states, probably one half the flour we consume, there is hardly any part of this state in which wheat may not be grown. Fair crops may now be occasionally seen within 40 miles of the sea-coast, perhaps nearer; and few soils or climates are better adapted to it than the upper parts of South Carolina. The flour made there, when skilfully managed, is not in the least inferior to the best that we receive from Virginia or the Lakes; and it only requires an impulse, such as the loss of the cotton crop will give, to convert our state into an exporter instead of importer of the article. The same may be said of every other kind of grain. We obtain large supplies of oats, rye, barley, and even Indian corn, from other states, when few or no states can grow them in greater abundance than our own. I do not allude to the fact to condemn the practice in the wholesale, as it is now becoming customary to do. The planter is but little more capable of raising to advantage every thing within himself than other persons, and if he is cultivating other valuable crops which will enable him on a fair calculation to purchase these things cheaper than we can now grow them, he is just as correct in doing so as the merchant is in buying his hat or the tailor his shoes, instead of making them in their own families. But when the more valuable crops fail, and the means of purchasing are taken from us, we shall be driven to produce provisions of all kinds, and I feel assured that we will soon find that we can do it as abundantly and cheaply as it can be done in any other place. The prospect of a foreign market is not very flattering, it is

true, but when England repeals her corn laws, which in a few years she will be forced to do, we can at least take our chances with the rest of the world for her market, and with some advantages on our side, if no unjust tariff shall prevent our receiving in payment such of her manufactures as we may not make at home.

But we might convert our surplus corn and grain into live stock as well as any people in the world, and thus keep at home immense sums which are annually drawn from us in exchange for horses, mules, cattle, hogs, sheep, and even poultry. Our climate has not been found too warm for any species of domestic animal. English cattle and sheep, as well as English horses, flourish even on our sea-board; and our mild winters enable us to keep all kinds of stock at comparatively little expense for either food or shelter. Our swamps are covered with natural and nutritious evergreens; most artificial grasses have been found to succeed; while among our own diversified productions, we have substitutes which render them scarcely necessary. Carrots, beets and turnips all do well. Pindars and sweet-potatoes, more valuable perhaps for stock than these, are peculiarly our products. With these two articles, the luxuriant cow-pea, and the common grains, we can, for 9 months in the year, furnish at a cheap rate, the richest and most abundant pasturage: and what country can do more? Indeed, in raising hogs, could we find a foreign market, or had we large cities or numerous factories among us to afford non-producing consumers, we could do a business not at all less profitable than growing cotton at 12 1-2 cents a pound. With tolerable pasturage, a hog weighing 200 lbs. net may be reared and fattened on 8 bushels of corn. On average land, 300 bushels to each hand and horse would not be more than a fair crop—100 bushels will feed the hand and horse, leaving 200 bushels surplus. With this 25 hogs, weighing 5000 lbs. net, may be raised. At 4 cents per lb. for this pork, or 6 cents when converted into bacon, the gross income per hand will be $200; while 1200 of cotton at 12 1-2 cents, will bring only $150 gross; thus enabling us to make a very liberal allowance for the trouble of attending to the stock and any errors there may be in the calculation. That we should, under these circumstances, ever purchase meat from other states, proves, I think, that there has been some want both of reflection and experiment. Yet, for this article, and other kinds of provisions, and for mules and horses, it is pretty certain that we send away annually in the aggregate the immense sum of $2,000,000 or more.

Tobacco and indigo our state produced largely at one time. They have been superseded by cotton, though still grown, I believe, in small quantities, and chiefly for domestic use. In some sections their culture can, and doubtless will, be revived with profit. The discoveries of marl and limestone will afford greater facilities for the manufacture of indigo than heretofore possessed. Sugar, of which we are now said to make 30,000 lbs. per annum, may be made here as cheaply, perhaps, as we can buy it, when the loss of cotton shall stop our supply of money from abroad. Unless, indeed, the duty be repealed, so that we can get it at half the present price, and probably in exchange for our provisions and other products. At all events its culture is practicable here; and where it will not granulate, an excellent and valuable syrup may be extracted from the cane; and that has been grown at 200 miles distance from the coast. Should it turn out that there is any ground for a statement which I have lately seen in a respectable agricultural journal, and apparently from a respectable source, that sugar has been made from corn stalks at the rate of 1000 lbs. to the acre, but a short period can elapse before every farmer in the country will regularly manufacture all he consumes.

Flax and hemp do well in the up-country. Castor and bene oil of the very best quality have been expressed in different parts of the state, and olive oil also may be made, for we know that the olive tree can be reared here. Tar, pitch and turpentine, considered so important elsewhere, we can produce to almost any extent; while with timber and lumber of several of the most valuable kinds, and with staves and shingles, we can for ages supply all the markets within reach, and do now furnish large quantities at excellent profits.

The cultivation of the vine has heretofore attracted some attention, but the attempt to make wine has generally been regarded as having failed. I have little doubt the failure has been owing in a great degree to the recent planting of our vineyards. It is well known in wine countries, that no vineyard is considered of much value until it has borne fruit for at least 20 years. Yet we have been disheartened because ours have not arrived at maturity in 5 or 6. A short and intense summer, or something in location equivalent to it, seems to be required for the perfection of the grape, and it is possible that being so far south, we may not be able to make the best qualities, at least of what are called white wines; though of this we should not despair until our mountain districts have been fairly tried. That we may, with due care and in due time, produce abundantly, in every section of the state, the light wines of Italy, and perhaps some of those of the south of France which are so highly prized, there is every reason to believe.

The experiments which have been made in silk culture leave no doubt whatever of our complete success in that. In fact, American silk is said, on very good authority, to be better than that made in any part of the old world. And in no part of America can it be better made than here. As a proof of this, an enterprising lady of one of our upper districts, obtained this year from the New York Institute, the first premium for the best silk grown and wove in the United States, against competition from almost every section of the union. It is stated by some of our historians, that so far back as 1759, 10,000 lbs. of raw silk was exported from South Carolina. Whether this be true or not, we all know that none of our soils are so poor, and no portion of our state so cold, as not to grow the mulberry in its utmost perfection. It is true that the enemies of the worm have been found very numerous, and its disease fatal; but it is ascertained that in all silk countries at least one half of them, from some cause or other, perish before spinning. If we were properly prepared to rear them, the mortality here would not, I am confident, be so great as that. And if, as it is supposed, nealy all that die fall victims of a disease called *muscardine*, and a remedy for that has

been discovered, as recently announced, in the use of lime, it is perfectly certain that in growing silk, we may very soon compete with, and probably excel, any other people. If by means of ice the worm can surely be retarded until the most critical periods of our other crops have passed, a crop of silk may be made which would be almost clear gain to the planter.

I have enumerated some of the most prominent of our productions to which we may resort when no longer able to grow to advantage the great staple, which for the last 40 years has absorbed all our husbandry. But why, when this event is made manifest, shall we confine ourselves strictly to agricultural pursuits, possessing, as we do, so many other resources, inviting and rewarding as amply here as elsewhere enterprise and industry? An all bountiful providence has blessed our favored region with mineral wealth of incalculable value. In many places within our state vast quantities of iron ore have long been known to exist, and within the last few years much enterprise has been exhibited and heavy expenses incurred to turn it to account. Already forges, furnaces, bloomeries and rolling mills, have been put in operation, and with every prospect of complete success. No coal has yet been found in the vicinity of any of these beds of ore. That is a discovery, however, which the geological character of the country gives ground to hope may be the reward of future research, while for a long time to come the immense forests near at hand will render it unnecessary. The consumption of iron of all kinds, exclusive of cutlery, in South Carolina, must, if she consume in equal proportion with the other states, exceed $2,000,000 per annum; and this sum kept among us would not only enrich the explorers of this hidden treasure, but contribute through a thousand channels to enrich the state. Veins of gold have also been opened, and some of our mines have proved more profitable, I am well informed, than any in the union—perhaps in the world. Quarries of marble, too, have been discovered, and beautiful specimens extracted: and granite forms the basis of one third of our state. Salt has been manufactured also on our sea coast, and there it no reason that it should not be made to any extent required.

GLEANINGS.

For the Farmers' Register.

King William county, May 18, 1842.

Peas may be successfully grown among corn, especially in light land, planted in every row, between every other hill, where the distance of the corn is 5½ by 3 feet; but much of the profit will be lost, if the old method of gathering by hand-picking be pursued. If planted before the 1st of June, after throwing the first furrow to the corn, the crop will have so nearly ripened by the middle of September, that the vines may be pulled up and hung on the stalks for a few days, when all the peas will be dried, (the few unripe ones dried green not injuring the sale.) Then they may be hauled to the barn-yard early in the morning, and after a few hours' sun, trod out with very little trouble. This method I have adopted from a neighbor, the profit of whose pea-crop for several successive years has exceeded his wheat. There were shipped from our county town, Aylett's, the past season, 10,000 bushels, at the average price of $1; and though my crop raised among the corn was but a very small part of this quantity, yet, at $1.12½ per bushel, I felt it, as a thrifty housewife with her good floor cloth of refuse rags, as so much "clear gain."

On the corn crop and its culture.—While I am satisfied by experiment that we have several kinds of yellow corn more productive on thin lands than the Maryland twin, I am not prepared to pronounce on the best for all lands. Our mode of culture I think about the best. After preparing the land well with plough and harrow on single beds, the grain is covered, and as soon as well up, with the single plough a list is thrown into the water furrow, leaving a space sufficient for a four-tooth cultivator, which leaves very little work for the hoe hands, except thinning the corn. We next throw a furrow on each side to the corn, lapping the dirt very moderately, and now the peas (small black-eyed) are planted; another furrow on each side over the whole field, and lastly the middles thrown out, which, on account of the list first thrown back, leaves a small water-furrow, and the land sufficiently level. A very slight weeding completes all necessary labor on that crop; for I have gleaned the fact that working corn, with almost any implement, after it tassels, is injurious rather than beneficial, while late working, in ordinary land, so effectually prevents the springing of grass, that there is nothing to be returned for the benefit of the succeeding small grain. Suggesting this idea to an observing farmer, who was in the practice of working his land too early and too late, a cold livery soil, readily *liquidizing* in winter, (excuse me for coining the word, which will, however, be very intelligible to the unfortunate owners of such lands,) he confirmed its correctness, by informing me that in a severe drought, fearing to break the roots on both sides of his corn, he passed his cultivators in a part of his field along every other row. The corn was no better than where they were not used; but in the succeeding spring, the wheat appeared a high bed and a low one, discoverable at a considerable distance. But I learned with surprise from my friend Braxton, not long since, that on Pamunkey it is a conceded point that wheat will not succeed after crab grass, which I believe almost invariably follows corn of the same year. We on Mattaponi have opposite experience.

Roots.—"The difference in the value of our roots fed raw or cooked" is so inconsiderable, except the Irish potato, or as a condiment for less savory food, that I doubt if the gain is equivalent to the cost of boiler, fuel and attendance. Grain is more digestible when cooked, but meal or fine hominy I think more valuable; for I have often observed whole grains of corn, although boiled, pass undigested even from ruminatiug animals.

Sassafras.—Being much annoyed at a former residence by sassafras bushes, I was informed by my old friend, the late Mr. Henry (Speaker) Robinson of Hanover, suffering with the like pest, that by leaving the original sassafras trees in clearing land, or turning out young ones in old land, the bushes would disappear. I accordingly had young trees trimmed and suffered to grow at

70 or 80 yards' distance apart. They have now acquired size to shade the cattle, but I have never seen a more abundant crop of the bushes than at present. I have tried grazing them at various seasons, deep summer grubbing, and cow-pens on spots without success; and believe there is but one infallible and permanent antidote, and this is what we in lower Virginia may well call the *grand restorative* of exhausted land, fire wood and rail timber, the old-field pine. On a farm adjoining me, as much infested with sassafras a few years since as perhaps any I ever saw, it is over a large surface entirely supplanted by the pine.

I will close these gleanings with a few observations on the subject of *gelding animals*. The operation should be done in warm weather, and exposure to wet or even damp atmosphere guarded against for a week at least. Without this precaution many a fine animal has fallen victim to tetanus or locked jaw. But the particular practice which I wish to suggest to my brother farmers is to substitute for the barbarous custom of searing, and the awkward one of clamping, the simple and safe one of tying the blood vessels, not with twine, however, but with animal ligatures, following the example of the surgeons: narrow strips of sheepskin dressed without tan, and rolled as the shoemakers do, will answer very well. The ends may be cut off short after tying, and in twenty-four hours all danger of bleeding will be over. Washing with salt water will be fully sufficient to excite suppuration, and anointing all the surrounding parts with elder leaves stewed in lard will prevent all inconvenience from flies. To all these items I would, as old Father Wesley, subscribe "Tried." W. G.

BENEFICIAL EFFECTS OF THE GREEN-SAND EARTH OF JAMES RIVER, RECENTLY OBSERVED.

By the Editor.

As it has fallen to my lot to make and to report much the greater number (indeed nearly all) of the experiments and applications of green-sand *alone*, as manure, in Virginia, and as the greater proportion of my applications have been profitless, or without effect, and the general results discouraging to the practice—notwithstanding some remarkable exceptions of powerful effects, produced by this earth—it is the more especially incumbent on me to report, without delay, some more recent trials and their very different results. The difference of results, with the supposed difference of circumstances, also, seems to throw some light, though feeble and uncertain as yet, on the heretofore dark and inexplicable differences of operation of what seemed to be precisely the same agent.

The new facts learned of the effects of the Pamunkey green-sand and green-sand marl, and reported in vol. 8 of the Farmers' Register, induced me to request of my son, who is co-proprietor and sole director of the Coggins Point farm, to resume the use of green-sand for experiment. His first experiment, stated below, was before reported (3d) p. 86, vol. x. Before its having any effect was despaired of, he saw at Evergreen the beneficial effects of an application, which he described in a communication published at page 645, vol. ix., and which experiment was commented on subsequently at page 135 of the current volume. This fact induced the larger application of last November. The green-sand earth used was dug from under the Coggins Point beach, which is all formed of it, after removing a few inches of sand, gravel or pebbles. The darkest was chosen, such being deemed the richest in green-sand. No gypsum was perceptible, nor any other known fertilizing ingredient, except the green-sand itself, and a few small fragments of shells, which would scarcely amount to as much as one per cent. of carbonate of lime in the whole mass.

Experiment 1.—In the spring of 1841, as much earth was dug, of the part first reached, as covered 8 acres, at 40 bushels to the acre. The land was a level loam, of good quality, then in wheat and clover. Two wide beds, in different parts of the ground, were left without being dressed, for comparison. The spreading carefully made to the marked outlines of these omitted spaces.

During all 1841, and up to 8th of May 1842, when the stock of cattle were first turned on, and soon grazed the whole bare, there had not been produced the least visible benefit or effect by the dressing. N. B. On this same land, the first observed very great benefits from green-sand were produced in 1827-9, and which did not remain but a few years, (See Exper. xxiii, p. 121, vol. ix., Farmers' Register.)

Exp. 2.—In December, 1842.—Enough earth was dug (adjoining and precisely alike in appearance to the last) to cover 40 acres more, at same rate, (40 bushels,) on clover sown in the spring or winter previous. Of this, the first used, and taken from the top or most exposed part of the bed, as before, has shown no effect up to May 21st, when the clover had reached full growth, and mowing for hay had been proceeding some days. After the dressing had covered some 6 or 8 acres, a marked interval was omitted; and another one after 5 or 6 more acres had been covered. The dressed clover, on each side of the first of these omitted spaces, showed a very slight benefit in May, and at the second interval greater benefit; but not regularly, and not enough altogether to repay the expenses of the application.

Exp. 3. The same rate of dressing as above stated was continued, and though no more marked spaces were omitted to compare results, there could be no doubt of there being very great, though irregular effects produced on the last 10 or 15 acres dressed. This was most apparent at the broken lines, where the work had been interrupted; and as it had not been designed as the conclusion, the out-line of the spreading was very crooked and irregular. The difference in product was every where most marked, and the dressed clover a vigorous growth, of rich deep green color, while the clover immediately adjoining, and not dressed, was comparatively yellow and mean. Several small detached spots of luxuriant clover were seen outside of the general dressing, and surrounded by the mean growth; and upon looking for the cause of such superiority, in each case a lump of green-sand earth was found in the middle of the rank spot, which had been thrown beyond the general spreading.

If both these applications had not extended beyond 15 acres, the results would have indicated

that the manure was not worth any thing. In the next 10 acres, there was not enough benefit to invite more extended applications. And it required to see the last 10 of the 48 acres, to be sure that the effect was indeed very great, and profitable for the outlay, even if the direct benefit shall cease with this one crop of clover.

The inference drawn from the great difference of result, and which causes to be awakened renewed hopes of future success, is that the upper part of the earth, from being long exposed to air and water, has lost its fertilizing ingredient or power, and that by digging deeper to obtain the manure, as profitable effects may generally be produced on clover, if on marled or other suitable soils. The first digging, for so small a quantity wanted, was necessarily all shallow. And of the second, the first 10 or 12 acres were probably dressed with earth dug from mostly within a foot of the surface. The space dug was large enough to allow the carts to enter, and sloped outward for their easy ascent when loaded. Of course, the latter part of the work must have been generally from the deepest dug earth, though not regularly so. The deepest part was about 3½ or 4 feet in the green-sand earth. Other and more extensive applications will be made during this year, and some accurate experiments on a smaller scale, which will at least serve to show whether this new ground for hope be well founded, or as deceptious as others have before been found.

As little of the whole space dressed as really showed much and certain benefit from the application, and irregular and variable as were the actual effects, still there was enough benefit to furnish, in spots, some 12 or 14 acres of fine clover for mowing; some of it as rank and heavy as could well stand. And without the use of the green-sand, judging from the appearances on as good land not so dressed, there would have been very little, if any clover worth the mowing. Of this general fact, the occupant of the farm is convinced, though he was incredulous, and hopeless of any valuable result until very recently.

Coggins Point, May 21st, 1842.

THE GROWTH OF WIRE-GRASS KEPT DOWN BY TOP-DRESSINGS OF LEAVES.

When an interesting fact, observed on Coggins Point farm, seeming to show this effect, was communicated not long since to the Farmers' Register, the writer was not aware, and we had forgotten, that a still more obvious proof of the same effect had been before observed on the same farm, and noted, by Mr. A. Nicol, when he was the manager there. The passage of the journal of the farm in which Mr. Nicol wrote down the observation when made, by accident has again fallen under our notice. It will be copied below, in the precise words of his entry in the farm journal, as written September 2, 1838.

"There is one singular result attending the application of leaves as top-dressing to wheat during the past winter, worthy of notice. In scattering the leaves, they were extended over a portion of ground thickly set with wire-grass. There is now on the leaf-covered portion of ground a very scanty portion of this pest growing; while on the ground adjoining, the growth is very dense. The line of separation is very distinctly marked, and follows all the little departures from a straight line made in scattering the leaves. The cause of this singular and unexpected result is of course uncertain—whether caused by the smothering effects of the early application of the leaves, or something in them injurious to the growth of wire-grass, has yet to be ascertained. That the first should have caused such an effect is scarcely probable. The covering of leaves was much too thin [to smother the growth,] and the fact that the remaining portion of the patch [of wire-grass] has been since thickly covered with straw without producing such an effect, renders this supposition extremely improbable. Nor do I know of any quality possessed by pine leaves that should be unfavorable to the growth of wire-grass."

This is a very interesting fact, and one which admitted of being observed with great accuracy; and it is rendered the more valuable because of the like result since observed by another witness, to whom the fact observed was also both novel and inexplicable. Whatever may be the manner of operation, the good effect may be easily obtained by means very beneficial in other respects. It seems to us clear from the facts above stated, that it was not by smothering the wire-grass that its growth was obstructed—but truly by the other supposed cause, that is, some quality of the leaves poisonous to wire-grass; and that quality we believe to be the *acid products* of pine or other leaves. Wire-grass delights in calcareous earth in a remarkable degree; and therefore the antagonist principle, or food, which is acid, must be as much injurious.

By planting Irish potatoes on the worst wire-grass turfs, (with or even without ploughing,) and covering them over thickly with pine leaves, as has been recommended in previous parts of this work, perhaps it might be found an easy mode of raising a crop, and the cheapest mode for destroying the wire-grass sod, and converting it to manure.—Ed. F. R.

CHARCOAL AS A MANURE.

From the Transactions of the New York State Agricultural Society.

There is no subject connected with farming that requires so great attention as "*manure.*" Let the land be ever so sterile and barren, it has been fully ascertained that by a judicious course of manuring it can be enriched and made productive. Let the soil be as rich and as full of succulent matter calculated for the producing and

nourishing the variety of plants necessary to be grown for the use of man and the benefit of the animal creation, a continued course of tillage, and a series of years' neglect of manuring will certainly render it barren and unproductive. Upon the state of the soil on every farm depends the living, we may say, of the farmer and his family, and carrying out the principle in its most extensive sense, upon the activity and intelligence of the farming community depends the whole interest of the entire commercial and civil community of any country. These facts are so evident to any man, who will take but a moment for reflection upon them, that it is a wonder indeed that more attention has and is not directed to this all important question, as to what are the best manures? No doubt the manures that are well calculated to produce a decided and active influence at once upon many soils would not act so readily and so permanently upon many other soils; but there are many manures that so act upon all soils; or, at best, there are many applications that may be made to almost any soil, that if they are not manures themselves, form the basis upon which the principles of other active manures may be made to produce the most astonishing effects. I have recently had my attention directed to the use of *charcoal*, by the knowledge of some facts that have been communicated in answer to my inquiries, that have induced me to devote a paper to the subject, in the hope, at least, that it will excite attention, and be productive, in the end, of great good to the community by inducing a series of experiments upon the use of charcoal as a manure, that will result in immense benefit to the farming interest.

I shall not pretend to enter into a series of reasonings upon the chemical affinities of charcoal to the soil upon which it may be applied; these matters I shall leave to those whose education and pursuits have better fitted them to ascertain these things, by enabling them to reach them by chemical analysis, which I am unable to make. I shall simply state the facts which I have observed, and those which I have learned from others, whom I have requested to look to them, together with the results that have been obtained, leaving to others to say whether the question is not of sufficient importance to lead them to try whether the results will not be equally beneficial in very many other situations.

In the neighborhood in which I live there are a great many hearths of coal pits, as they are called; places where wood has been piled, and burned into charcoal, scattered about the country. I have invariably observed, that upon these hearths, in the course of a few years, a luxurious coat of grass made its appearance, when all around in the vicinity scarcely a blade of grass could be found, and what there was found out of the coal hearth was sickly and dwarfish. This was so well known that in the heat of summer, when the pasture in other places was dried and withered by the summer drought, it was a common practice to drive the cattle to the "coalings," as they are called, sure that they would there obtain food. During the last autumn, business called me into Harford county, in Maryland. While there I was surprised at the exceedingly luxuriant growth of a crop of grain but lately seeded in a field, on Deer creek, and also at the very peculiar appearance of the soil. The soil upon which the grain was growing had a remarkably dark appearance, and appeared to be so mellow and friable as nearly to bury the foot at every step, and although it lay very level, did not appear to the touch to be so; not as the soil in the other fields around it on the same level. My attention was excited by what I saw, and I inquired if the field had not been covered with charcoal, and was told that it had been. I inquired when it was done, and was told it had been spread upon it more than *twenty years* ago!! I then asked what was the general quality of the crops raised upon it, and I was told that they were invariably fine, both as to quantity and quality. The person who lived upon the property informed me that he had repeatedly hauled the soil from that field and spread it upon the surrounding fields, and he could, for years, or in fact from the time he spread it there to the present day, always see, by the growth upon these places, exactly where he had put it!!

I had for some time past had my attention directed to the subject, but here I found it fully developed to my full satisfaction.

When I returned home, I made it the subject of conversation frequently with the farmers in our neighborhood, and from one of them I learned that when he lived in Chester county, Pa., with his father, a part of their farm became worn out and unproductive. It was abandoned for several years, and in the mean time many coal pits had been formed upon several of the old fields, by drawing the wood there to burn into coal, that had been cut in the adjoining timber lands. After some time they again put those fields under tillage, and he states that wherever a coal hearth had been left, there the crop of grain and the growth of grass was equal, if not superior, to that which grew upon any of their most productive fields. Another case of the application of charcoal I have found in this neighborhood was made by a gentleman in the iron business to his meadow, near the coal house. He had a large quantity of the coal that had become too fine to be used in the furnace; he did not know exactly what to do with it, it was in the way, and he concluded, as the easiest way to dispose of it, to haul it out and spread it upon the grass land. He spread it late in the fall, and for many years he informed me he observed the most astonishing effect produced upon his yield of grass. The quantity was nearly double, and the effect continued as long as he owned the property, which was at least ten years; so he informs me.

From what I can see of its effects, where a large quantity is left upon the ground, as for instance, in the centre of the hearth, it takes a considerable time for it to acquire a sufficient degree of moisture to penetrate to the bottom, and until it has acquired that degree of moisture nothing will grow there. Around the outer edges of circles where it is thrown upon the ground it is soon saturated with moisture, and vegetation is soon facilitated, and goes on rapidly. I should judge, from this, that when about to be applied to land the coal should be ground fine, and then thoroughly wetted and sown or spread with a lime spreader over the surface of the soil. From the circumstance of its being easily powdered or mashed up, I should suppose that the process would be very easily effect-

ed by making a floor of plank, say circular, and procuring a good sized stone, to be affixed by a shaft to an upright post, throw the coal into the circular planked way, and attach a horse to the shaft passing through the stone, and drive him round, carrying the stone, in its passage, over the coals. A very simple and easy process, precisely similar to the old fashioned way of grinding or breaking up bark, practised by the tanners, previous to the invention of the cast iron mill now in use. The cost of covering an acre would be trifling, and if it produced no other effect than that of forming a permanent vegetable basis in the soil, for lime to act upon, it appears to me it would well repay a greater amount of labor and expense than would be necessary to try it.

I have just been made acquainted with another result of the application of charcoal to arable land, that if general, from its application, will induce its use by every one who can procure it at a reasonable price: that is, wherever charcoal has been applied *rust never affects the growing crop of wheat!!* My friend who has communicated this fact to me states, that he has observed it particularly, and when the field generally has been "struck with rust," as it is called, those places where he had applied the charcoal *invariably escaped.* J. H. HEPBURN.

Jersey Shore, Lycoming Co., Pa.

From the (London) Farmers' Magazine.

CAUSES OF FIRE.

Mr. J. Murray has published a letter in a Liverpool paper on the frequency, causes, and prevention of fire, which contains many facts well worthy of attentive consideration. Among other observations, he says--

"There is far too little attention paid to the locomotive engine on our railroads. The ignited coals that fall below are often blown to considerable distance, carried into the adjoining fields, and may, in contact with farming stock prove a serious evil; and I have witnessed brushwood and tufts of grass consumed by this means. A green taper, colored as it is by means of oxide of copper, when blown out, acts on an aphlogistic principle, and may continue to the end of the coil in an ignited though flameless state, and, in contact with combustible materials, may prove seriously destructive. It has set a mahogany table on fire—providentially discovered in time. Damp rags, *en masse*, may spontaneously take fire, and have consumed the premises. Linseed and other oils, but especially that of linseed, have been the fruitful sources of conflagration in cotton factories and the warehouses of merchants. Nets dipped in oil, and cast over the rafters in an outer shed, set them on fire; and a bale of cotton wool burst into a flame from linseed oil being poured upon it. Even animal matters, such as woollen, under such circumstances, come within the precincts of danger. I find that strong red fuming nitric acid will set fire to straw; and an accident of this kind once occurred to myself. The vapor of sulphuric ether, instead of being volatile, and ascending, as is generally supposed, falls to the ground like water; and accidents in the laboratory and shop of the druggist, from ignorance of this fact, are by no means unfrequent. I am personally acquainted with three distinct cases, wherein the premises were set on fire originating in this source. Specks of bull's eyes in window glass may, on the principle of burning lens, ignite inflammable substances brought within the limits of their focus; hence the curtains used in some factories may be easily ignited; thus, too, a water-bottle left in a window, may in sunshine be the means of setting premises on fire, especially in a house shut up during the absence of the family; and I have seen a silk curtain consumed to tinder by the concentrated rays of the sun, in passing through the show-bottle in the druggist's window. Spirits of turpentine will inflame if poured out in the hot sunbeam; and I am informed by the distillers of tar and turpentine that the head of the still cannot be safely removed for thirty hours after the fire has been extinguished, as an explosion might be otherwise anticipated. Lucifers, or Congreve matches are one of the fruitful sources of fires. Those that are called Dutch, containing phosphorus and having a very fætid phosphoric smell, are exceedingly dangerous: they may ignite spontaneously at the temperature of summer heat; and it may now suffice to say that a recent conflagration has been traced to this cause. The cigar and the pipe are pre-eminent sources of modern conflagration; and I have no doubt that of the seat of the Marquis of Londonderry, and the late one of York Minster, are entirely attributable to the pipe or cigar used by the workmen engaged in repairs. It is not generally known that tobacco contains nitre, and that, like touchwood, it continues ignited for hours. Fires occuring from this cause are, I apprehend, too notorious to need specific detail. It is clear that the end of a cigar dropped among wood shavings might be fanned into a flame by a current of air; and tossed from the top of a coach into an adjoining field, and carried by the breeze into a farmer's stack-yard, hay ricks and wheat stacks may even burst into a flame. I believe many a cigar smoker is an unintentional incendiary.

"Fires in farm-yards also may originate from quick lime left in a cart under a shed, and moisture getting to it. Heat sufficient to cause combustion is developed. The spontaneous combustion of hay-ricks from the dampness of the hay, is a danger to which the negligent farmer is often exposed. In our present state of chemical knowledge it is idle to attempt to follow this phenomenon through its course, or to explain the reasons for the heat produced in fermentation. As water must be present in fermentation, it is probable that it is decomposed, and it is commonly said that the flame produced is the result of intense chemical action; but, as Dr. Thompson remarks, (System of Chem., vol. iv. p. 364)—'All the phenomena of fermentation lay for many years concealed in complete darkness, and no chemist was bold enough to hazard an attempt even to explain them. They were employed, however, and without hesitation too, in the explanation of other phenomena; as if giving to one process the name of another of which we are equally ignorant, could, in reality, add any thing to our knowledge.'"

IRON HOOPS FOR COTTON BALES.

From the South-Western Farmer.

Why so much opposition in New Orleans to this very valuable improvement in baling cotton, and why is it so?

The iron hoop possesses all the advantages of rope and many more; it is equally as cheap, as strong and as easily put around the bale, and has a great advantage over rope in the event of fire. You could not burn up a steamboat load, or a warehouse full of cotton bales, in a month iron hooped. A cotton bale never burns much, until the ropes burn in two, and the bale expands. Cotton iron hooped need not be insured down the river, nor in the city—nor need it be re-pressed in New Orleans. Many planters are now compressing their cotton to the shipping size, and in a little time it will be the general custom of the country.

Then, why shall the planters incur the great expense of a double cut at insurance—one down the river and another in the city, with a finishing touch of 75 cents per bale for compressing, when there should not exist the least necessity for such charges?

But the planters must expect the iron hoops to be violently opposed by the insurance and steam press interest in New Orleans; but they have only to persevere and act in concert to overcome all opposition.

It is said that the hoop where it presses on the bale, will rust and injure the baling cloth. Such an argument is not reasonable, as where the hoop presses on the bale is entirely water tight, and all of the rust must be on the outside of the hoop, which could be entirely prevented, by brushing the hoop with a little paint or pitch.

The hoop iron, is sold at the factories at 5 cents per lb. Now is the proper time for the planters to send on their orders for the growing crop; which can be forwarded through the merchants at Vicksburg or New Orleans—many of the factories in Pennsylvania, Ohio and Tennessee having agents in those cities. A. PLANTER.

FEEDING ON COTTON SEED.

From the South-Western Farmer.

Near Clinton, April 28th, 1842.

In your valuable number of the 8th inst., I read some suggestions from a correspondent and from yourselves, in relation to feeding on cotton seed; and as neither of you have mentioned the plan, upon which I think they can be most usefully prepared, I will give the result of my experience and my plan to the public.

I have a large kettle, which holds from 5 to 6 bushels, set upon a brick furnace, (which is less than one day's work for a mason to make.) I fill my kettle with cotton seed fresh from the gin, and then fill up the kettle with water, and boil something less than half an hour. Then empty the seed into troughs, and let my cattle and hogs to them. The milk and butter has none of that cotton-seed taste, which the green or uncooked seed give. Both cattle and hogs will keep in good order, winter and summer, on seed thus prepared; and when you are ready to fatten pork, you have only to add an equal quantity of cotton seed and corn, and boil as above. Experience has proved to me that it will fatten sooner, and be equally good as when fattened on corn alone. Your cows will give an abundance of milk all winter, when fed in this manner, with but one bushel of corn to four of cotton seed. Every one is aware of the advantage of boiling turnips, turnip greens and cabbage for the human stomach. The boiling of cotton seed is not less advantageous as food for stock. Besides, there is great economy in feeding seed thus prepared. By the usual method in feeding, there is more than double the quantity of seed wasted that are consumed by the stock.

So far as I have heard, every person who has ever tried this plan, has been well pleased with it. Very respectfully,

D. O. WILLIAMS.

Messrs. North & Jenkins.

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